THE
ANIMAL DOCTOR

HAROLD LEENEY

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CONTENTS

INTRODUCTION

DIAGNOSIS—DISCRIMINATING BETWEEN DISEASES

CHAPTER I

PAGE
DISEASES OF THE BLOOD OR SPECIFIC DISEASES 11
Anthrax 12
Black Leg, Quarter-Ill, Struck, Pook, etc. 15
Purpura Hemorrhagica, Big Head 17
Texas Fever, Red Water, Muir-Ill, etc. 20
Azoturia-Hemoglobinuria 23
Braxy in Sheep. Louping Ill 24
Cattle Plague 25
Foot-and-Mouth Disease, Murrain, etc. 25
Glanders and Farcy. Fassy. The Fass, etc. 27
Lymphangitis, Weed, Big Leg, Monday Morning Leg 30
Elephantiasis 32
Pink Eye, Influenza 32
Dog Influenza 34
Rabies, Madness, Hydrophobia 36
Dumb Rabies 38
Tuberculosis and Tuberculin Testing 40, 44
Johne's Disease 46
Strangles, Febra Pyogenica 47
Hog Cholera, Swine Fever, Red Soldier, etc. 50
Tetanus, Lockjaw 51
Rheumatism 54
Lumpy Jaw, Wooden Tongue, Actinomycosis, etc. 56

CHAPTER II

DISEASES OF THE HEART AND BLOOD VESSELS 59
Inflammation of the Heart, Carditis 60
Hypertrophy or Enlargement of the Heart, Dilated, etc. 60
Inflammation of the Heart Membranes, Pericarditis, Dropsical Heart, etc. 61

CHAPTER III

PAGE
DISEASES OF THE DIGESTIVE SYSTEM 64
- Dentition of the Horse, Ox, Sheep, Pig 67-74
- Diseases and Irregularities of the Teeth 76
- Fractured Teeth, etc. 77
- Decay or Caries of the Teeth 78
- Parrot Mouth 78
- Wolf Tooth 79
- Sore Lips 79
- Inflammation of the Mouth, Stomatitis, Aphtha, Thrush 81
- Inflammation of the Tongue, Glossitis 82
- Lampas, Congestion of the Palate 83
- Inflammation of the Throat, Pharyngitis 83
- Abscess of the Throat 84
- Salivation or Ptyalism 85
- Inflammation of the Parotid Gland, Parotitis 86
- Open Ducts, Fistula of the Parotid Duct 86
- Salivary Calculi, or Spittle Stones 87
- Choking 88
- Vomiting 92
- Indigestion: Acute, Chronic 92, 95
- Gastritis, Inflamed Stomach 97
- Ruptured Stomach 99
- Colic, Gripes, Fret 100
- Flatulent Colic 104
- Constipation 107
- Diarrhea 109
- Superpurgation 111
- Dysentery 112
- Enteritis, Inflammation of the Bowels 113
- Ruptured Intestine, or Burst Gut 116
- Intestinal Obstructions. Blocked Gut 117
- Eversion or Inversion of the Rectum 119
- Diseases of the Liver 120
- Congestion of the Liver 120
- Jaundice, the Yellows, Icterus 122
- Inflammation of the Liver 123
  - Hepatitis 123
  - Cirrhosis 124
- Fatty Liver—Fatty Degeneration 125
- Rupture of the Liver, Burst Liver 126
- Dropsy, Abdominal Ascites 127
- Spasm of the Diaphragm 128
- Hernia or Rupture, Strangulated, Scrotal, Ventral, Umbilical 129, 131

CHAPTER IV

PAGE
Diseases of the Urinary Apparatus 133
Retention or Stoppage of Urine 134
Incontinence or Leaking 136
Diabetes, Polyuria, Profuse Staling 137
Bloody Urine, Hematuria 138
Inflammation of the Kidneys 138
Inflammation of the Bladder, Cystitis 139
Stone or Calculus in the Bladder 140
Eversion, or Expulsion of the Bladder 142

CHAPTER V

Diseases of the Nervous System 144
Cerebritis and Meningitis 145
Sleepy Staggers 145
Megrims, Vertigo, Giddiness, Staggers 146
Abscess in the Brain 148
Epilepsy, Catalepsy, Fits 148
Eclampsia, Fits after Parturition 149
Chorea, or St. Vitus' Dance 149
Stringhalt 150
Apoplexy, Sunstroke 150
Crib Biting 152
Tumors in the Brain and Skull 153
Inflammation of the Spinal Membranes, Spinal Meningitis 154
Inflammation of the Spinal Cord, Myelitis 155
Inflammation of the Membranes of the Cord in Dogs 156
Paralysis 157
Cerebro-Spinal Meningitis in Horses, Infectious 157

CHAPTER VI

Diseases of the Respiratory Organs 159
Catarrh or Common Cold 159
Nasal Catarrh (Chronic), Nasal Gleet 161
Bleeding from the Nose, Hemorrhage 163
Sore Throat 164
Diseases of the Larynx 164
Roaring, Whistling, and Thick Wind 167
Bronchitis (Chronic) in Dogs 170, 173
Congestion of the Lungs 174
Inflammation of the Lungs 177
Bleeding from the Lungs, Hemoptysis 180

PAGE
Asthma 180
Broken Wind, Emphysema of the Lungs 181
Pleurisy, Pleuritis 183
Cough 186
High Blowing 186

CHAPTER VII

Constitutional Diseases 188
Rheumatism 188
Lymphangitis, Weed 190
Purpura Hemorrhagica 190
Hemoglobinuria 190
Infectious and Contagious Diseases 191
Dourine 191
South African Horse Sickness 192
Epizootic Lymphangitis 192

CHAPTER VIII

Diseases of the Male Organs of Reproduction 193
Phymosis, or Enclosure of the Penis 193
Paraphimosis, or Inability to Intake the Penis 195
Edema of the Sheath 196
Amputation of the Penis 197
Gonorrhea, Clap 198
Orchitis, or Inflammation of the Testicles 198
Diseases of the Female Organs of Reproduction 199

CHAPTER IX

Diseases of the Female Breeding Organs 200
Parturition, etc. 200
Polypi 201
Constriction 201
Acidity of the Vagina or Uterus 202
Diseased Ovaries 203
Whites or Leucorrhea 204
Bull-Burnt, or Infectious Gonorrhea 204
Abortion 205
Infectious Abortion 206
Carbolic Saturation 207
Parturition 208
Not Cleansing. Retention of the Placenta 219

PAGE
Eversion of the Womb, or Falling of the Calf-Bed 220
Inflammation of the Womb 222
Eversion of the Bladder 224
Dropping Before Calving 224
Milk Fever, Parturient Apoplexy, Dropping after Calving 225
Milk Fever in Sows and Bitches 229
Puerperal Mania 230
Parturient Laminitis 230
Parturient Fever 231
Garget, Mammitis, Mastitis, Caked Bag 231
Peas in the Teats 232
Leaking Teats 234

CHAPTER X

Defects and Diseases of the New-Born 238
Suspended Animation 238
Not Sucking 239
Orphan Rearing 240
Composition of Milks 242
Constipation of the New-Born 244
Soft Feet and Deformity 244
Leaking Navel, Pervious Urachus 244
Enlarged or Ruptured Navel, Umbilical Hernia 246
Navel Ill, or Inflammation of the Navel String 248
Joint Ill 249
Tongue Tie 250

CHAPTER XI

Diseases of the Skin 251
Erythema 253
Wheals 253
Papules 253
Vesicles 253
Pustules 253
Squamæ 254
Pityriasis 254
Tubercula 254
Ulcers 254
Excoriations 254
Pocks or Pox. Vaccinia 254
Cow, Horse and Sheep Pox 255-258
Eczema 258

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PAGE
Mallenders and Sallenders 260
Grease or Eczema, Impetiginodes or Pustulosum 261
Chapped and Cracked Heels 263
Mud Fever, Erythema 264
Nettle Rash, Urticaria, Surfeit 265
Burns, Scalds, and Frost Bites 266
Bites and Stings 268
Ticks 270
Warts, Angleberries, Wens, Verrucæ 270
Horn Troubles 272
Mange or Scab 273
Leg Mange 276
Sheep Scab, or Mange 277
Mange in Dogs and Cats 278
Ringworm. White Flaw 279
Honeycomb Ringworm, or Favus 280
Fly Maggots, Sheep Fly, etc. 280
Fleas, Lice, Ticks 282
Canker of the Ears 283
External Canker 284
Abscesses, Boils, Lumps, Bumps 285
Galls from Saddle and Harness 287
Sitfast 288
Fistulous Withers 289
Acne, or German Measles, in Horses 291
Itching Legs, Tails, and Ears 292-294
Fistula of the Ear 294
Wounds 294
    Clean cut, or incised Wounds 295
    Lacerated Wounds 295, 297
    Punctured Wounds 297
    Contused Wounds 295, 298
Poll Evil 299
Broken Knees 300

CHAPTER XII

DISEASES OF THE BONES 304
    Ringbone 304
    Splint 306
    Spavin 308
    Occult-Spavin 311
    Inflammation of the Bone 311
    Chronic Ostitis 311

PAGE
Necrosis and Caries 311
Big Head—Osteoporosis 312
Sore Shins—Metacarpal Periostitis 312
Fractures, Broken Bones 314
Knocked Down Hips 317
Sprains or Strains 317
  Strain of the Back Tendons 319
  Strain of the Suspensory Ligament 319
  Strain of the Tendo-Subcarpal Ligament 320
  Sprain of the Fetlock 320
Sesamoiditis, Inflamed Bones 320
Hip-Joint Lameness 321
Stifle-Joint Lameness 321
Stifle-Slip, or Luxation of the Stifle-Joint 322
Shoulder-Slip 322
Luxation, or Overshot Fetlock 323
Open Joint 324
Dropsical Joints 326
Bog-Spavin 326
Thorough-Pin 327
Sprung Hock 328
Capped Hock, Capped Elbow, Shoe Boil, Capped Knee 329
Windgalls 333
Timber Leap 333
Curb 334
Brushing, Cutting and Interfering 335

CHAPTER XIII

Diseases of the Foot 338
  Sand Crack 338
  Seedy Toe 340
  Corns 341
  False Quarter 343
  Quittor 343
  Foul of the Foot in Cattle 344
  Thrush 345
  Canker 346
  Pricked Foot 347
  Fever in the Feet, Laminitis 349
  Sidebone 352
  Navicular Lameness, Grogginess, Shoulder-Tied 353
  Inflammation of the Coronet, or Villitis 355
  Carbuncle 355

PAGE
Tread 355
Horn Tumors 356
Brittle Feet 356
Foot Rot in Sheep 357
Foot and Mouth Disease 358

CHAPTER XIV

ONDITIONING 359
Show Condition 361

CHAPTER XV

PHYSICKING AND PURGING 363
Horses are Prepared for Physic 363
Purging Cattle, Sheep and Pigs 364

CHAPTER XVI

BLISTERING AND FIRING 365
Dressing a Blistered Limb 367

CHAPTER XVII

OPERATIONS 368
Castration 368
The Actual Cautery 370
Castration by Ligature 371
Trapping 372
Mulling 372
Lambs 373
Spaying 373
Bleeding 375
Docking 377
Unnerving, Neurectomy, Neurotomy 378

CHAPTER XVIII

DISEASES OF THE EYE 379
Ophthalmia or Simple Inflammation 379
Constitutional or Periodical Ophthalmia 381
Ulceration of the Cornea 382
Spots on the Eye, Albugo, Clouds, Nebulæ 382
Grape or Staphyloma 383
Diseases of the Humors of the Eye 384

PAGE
Glaucoma ... 384
Cataract ... 384
Iris ... 385
Glass Eye, Amaurosis ... 386
Squinting, Strabismus ... 386
Sore Eyes ... 387
Wounds of the Eyelids ... 388
Overflow of Tears ... 388
Worm in the Eye ... 388
Dislocation of the Eyeball ... 388
Anesthesia ... 389
General Anesthesia ... 390

CHAPTER XIX

HEMORRHAGE, BLEEDING ... 393
Internal Hemorrhage ... 394

CHAPTER XX

PARASITES, WORMS ... 396
Tapeworms, Cestoda, Tæniæ ... 397
Rounds Worms and Thread Worms ... 400
Strongyles ... 402
Husk, Hask, Hoose, Verminous Bronchitis ... 403
Flukes, Liver Rot Worms ... 405
Bots ... 407
Ox Warbles ... 408
Sheep Bots, Œstrus Ovis ... 408

CHAPTER XXI

GENERAL THERAPEUTIC MEASURES ... 410
Antiseptics, Disinfectants ... 410
Disinfection of Buildings ... 411
Disposal of Dead Animals ... 413
Methods of Control ... 413
Sick Foods, Care of the Sick ... 418
Light ... 419
Gruel ... 421
Bran Mash ... 421
Linseed and Bran Mash ... 421
Bread ... 422

PAGE
Eggs, Milk and Meat ... 422
Fermented Liquors, etc. ... 422
Water ... 423

CHAPTER XXII

ADMINISTRATION OF MEDICINES ... 424
Giving a Ball ... 425
Drenching ... 426
Electuaries ... 427
Powders ... 427
Giving Medicine to Swine ... 427
Clysters or Enemata ... 428

CHAPTER XXIII

DOSE TABLES, POISONS, ANTIDOTES, ETC. ... 430
Dose Tables ... 431
Weights, Measures, and Other Substitutes ... 433
Balls for Horses ... 434
Electuaries ... 442
Draughts or Drenches ... 443
Horse Powders ... 445
Cattle Medicines ... 449
Sheep Medicines ... 451
Medicines for Pigs ... 452
Dog Medicines ... 454
Medicines for Cats ... 456
External Remedies ... 456
Hypodermic Medication ... 457
Embrocations or Liniments ... 463
Blisters ... 466
Ointments ... 466
Plasters or Charges ... 468
Lotions ... 469
Oils ... 473
Castrator's Dressing Powder for Caustic Clams ... 474
Arsenic Paste for Warts ... 474
Poisons and Antidotes ... 474

INDEX ... 479

ILLUSTRATIONS

FIG. PAGE
1. Clinical Thermometer 4
2. Trench 15
3. Big Head, Head Swollen with Purpura 18
4. Hypodermic Syringe 19
5. Monday Morning Leg 30
6. Strangles, Abscess Pointing, Ready for Lancet 48
7. Tetanus, Stiff as if all in One Piece, Shows White of Eye, and Tail Erect—Nearing the End 52
7a. Dentition of the Horse, Ox, Sheep and Pig 68-74
8. Probang, or Choke Rope 88
9. Male Catheter 134
9a. Female Catheter 134
10. Catarrh, or Common Cold 160
11. Insufflator 162
12. Tracheotomy Tube 166
12a. Tracheotomy Tube 168
13. Ordinary Head and Front Legs Presentation 210
14. For and Aft Presentation 211
15. Crutch 213
16. Head in Right Direction, but Legs Down 214
17. Legs in Line, but Head Turned Back 215
18. Breech Presentation, with Legs Down 216
19. A Case to be Turned Over 217
20. Embryotomy Knives 218
21. West's Clamp 221
22. Milk-Fever Syringe 227
23. Milk-Fever Syringe for Liquids 228
23a. Teat Compressor 228
24. Milk-Fever Air-Pump (Sterilized) 228
25. Papillatome 233
26. Milk Syphons, or Teat Tubes 237
27. Umbilical Hernia Clamps 247
28. Grease—Advanced Case 261
29. Horn Trainers 272
30. Mange—Wrinkled Skin 274
31. Ringworm on Cattle 279

FIG. PAGE
32. Putting a Seton through Fistulous Withers........................ 290
33. Poll Evil 299
34. Seton Needle 300
35. Cutting and Brushing and Ringbone 305
36. High Chair Splints 307
37. Spavin 309
38. Leg Splint 313
39. Trusses 327
40. Trusses 328
41. Trusses 328
42. Capped Hock 329
43. Stifle Enlargement, Capped Hock, Capped Elbow, Timber Leap, Capped Knee, Knee Spavin or High Splint 330
44. Windgall 332
45. Curb 334
46. Cutting and Brushing 336
47. Speedy Cut 336
48. Boots (Various) 337
49. Sand Crack. Clamp 339
50. Seedy Toe. Section showing separation 340
51. False Quarter 342
52. Quittor and Ringbone 343
53. Quittor and Tread 344
54. Quittor and Tread 344
55. Laminitis—A Pumiced Food with French Rocker Shoe 349
56. Laminitis—Showing Descent of the Coffin Bone 350
57. Side Bone (Exposed) 352
58. Sling 417

INTRODUCTION

DIAGNOSIS.—DISCRIMINATING BETWEEN DISEASES

THE importance of first ascertaining what is the matter with an animal before proceeding to doctor it should be apparent; yet it will be confessed by all honest practitioners that they have frequently to prescribe for patients, pending a full or complete knowledge of what ails them. The practice of medicine is still largely empirical, but science is constantly adding to our means of diagnosis and more and more value is placed upon a correct opinion of the disease, and less and less upon drugs as curative agents. The study of hygiene and the art of preventive medicine has led to an average prolongation of human life, and a conservation of the health and wealth of nations by its application to the domesticated animals. In the following pages we propose to consider the signs or symptoms of disease as presented to the eye, the hand, and the ear unaided, as well as assisted or exalted by various appliances. The first essential towards recognizing a malady is to be familiar with animals in health; their habits, behavior, and expression of countenance; their normal attitudes when in motion or at rest; the color of their membranes, the feel of their skins, the character of their respiration, and the sounds they utter. A farmer's son with equal educational advantages and trained observation will make a better veterinary doctor than others who have not in early life lived among and unconsciously acquired a large amount of information while watching the feeding, watering, grooming, milking and other common operations of the stable and the byre. He knows what an animal will do under certain circumstances, reads its mind, so to speak, and when it acts otherwise he will suspect something is amiss, and inquire into the cause. For want of such practical intimacy with the life of animals, many graduates of the veterinary schools who enter late fail to observe symptoms and note behavior in patients which may be of great importance in diagnosis. The reader who has studied under an experienced practitioner will have noted that the doctor does not rush up to a patient to which he has been called, but pauses at the door of the sick box and asks some questions: it may be only to hinder the nurse from entering the apartment while account is taken of the attitude and behavior of the beast at a distance, or he may have a double object in inquiring if the bowels have acted, and such like things, which he can note at the same time, being in the habit of collecting evidence with his ears from the attendant, and with his eyes from the patient. This habit can be so cultivated that he knows how much or little confidence to place in what is told him, and decides in his own mind whether or no he must verify what has been said, by other means. He notes the attitude, which may be one of excitement or dejection, feels the ears and legs, and the horns, if a bullock having such things, notes if they are cold or hot, or differing from each other in this respect. Then the membranes of the eye and nostril come under examination. These may be reddened and the little blood-vessels standing out "injected," as it is called—or abnormally pale—anemic, or discolored, as in jaundice, or spotted, as in purpura. He feels for the submaxillary artery at the angle of the horse's jaw in order that he may take the pulse. The under surface of the tail is a more convenient place to feel the impulse of the vessels in a beast, and if a dog is the subject of inquiry, the femoral artery can be felt inside the thigh. It matters not where the heart's contractions are gauged: any artery will do, but experience tells us that the above are the most convenient in the different species. Membranes much reddened, indicate inflammation or fever, and will be accompanied by a pulse more than ordinarily fast but having less force. Such a sensation imparted to the finger is spoken of as small, weak, wiry, thready; and shows a heart beating in correspondence; imperfectly performing its office as a pump. To carry the simile a little farther, we may point to the fact that short, jerky efforts on a pump-handle will not result in a full volume of water from the spout, and this is the case with the arteries, which are conduits, deriving their contents from the central organ and contracting themselves in sympathy. As a rule, we content ourselves as to the heart by measuring the force in the vessels. We may push the question home by applying our ears to the ribs, especially when we suspect something wrong with the organ itself. We may feel its impulse at a distant artery and fail to detect its beating when our ear is applied to the region, and ask ourselves how is this? The investing membrane (pericardium) is filled with fluid, and if the heart is heard at all, it is as a muffled drum in the distance. In the diagnosis of disease in general, we therefore depend a good deal upon the pulse. A big, thumping, hard pulse generally points to head trouble and will be found during a fit of megrims, or any congestion of the brain, but in most diseases there is a tendency to increased temperature and quickened but enfeebled pulse. We consult the thermometer, placing it in the rectum or vagina, and note if it is above the normal. If pulse and temperature agree in showing fever, we have next to inquire as to what organ is affected, or if it is a general condition, as influenza, or the invasion of strangles. The circumstances will have to be taken into consideration, as the age of the animal, its association with others, the work or purpose to which it is put. The colt at grass with others, may be suspected of strangles, and pressure exerted upon the throat to ascertain if it is swollen or tender. In the case of a recently calved cow with a high temperature, we shall inquire as to the milk, and feel the udder, which may give us the exact information; or, finding it normal, direct our inquiry to the genital passage and possibilities of septic poisoning after difficult parturition. If we are called to a horse that is "blowing," we must know whether this shallow and rapid respiration is but an expression of pain in the abdomen, or of lung trouble. The consideration of the temperature and the pulse will here again help us to decide. Most sick animals lose appetite, and as to this, we observe if food has been left, and make inquiries of the person in charge, who should be able to tell us also if the patient is purged or bound or passes a profuse amount of urine or fails to pass any, or what is voided is abnormal in consistence and odor. A cough and difficulty of swallowing will direct our inquiries to the throat and chest, where with hands and ears we may learn something of what is going on inside, and take some measure of the case with the assistance derived from the pulse and temperature.

A painful cough on the one hand, or violent purging on the other, may be taken as examples of what are called attractive symptoms; they attract our attention to the thorax or the abdomen, and limit the field of our inquiry, and enable us to concentrate our attention upon particular symptoms or indications. Diagnosis may be aided or hindered by information volunteered or withheld from the doctor, and he needs some of the training of the cross-examining counsel in order to sift evidence and assign to it a proper value. Men in charge of animals may be so wanting in the power of observation that they cannot tell whether an animal has evacuated or not, although they have cleaned the gutters or stalls; and in matters of measure they seem not to differentiate between a handful and a bucketful of anything; unless it is something to drink. A further and perhaps greater hindrance to correct diagnosis is the attendant's guilty knowledge of some neglect or accident or abuse of drugs, as when he has neglected to carry sufficient water, or has led a horse against a stall post, or struck him with a fork, or used arsenic instead of elbow grease to make the animal's coat shine.

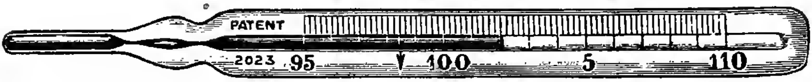


Fig. 1.—Clinical Thermometer.

Enough has been said to show that diagnosis taxes our powers in many cases, and in some beyond finding out, but that there are certain general symptoms of illness and means of examination and inquiry which if carefully conducted will in the majority of instances enable us to form a fairly correct opinion as to what is wrong. The diagnosis of lameness presents greater difficulties; contrary to the general opinion of amateurs. (See page 5.)

Below will be found a table of average temperatures in different species of animals. A sudden and very high temperature is not generally so serious a matter as one of two or three degrees lower, but *long maintained.* For example, in garget, temperature may run up to 107° F. and even much higher without risk of death, for it will *soon come down again.* A horse with a temperature standing at 103° F. for days will be in much greater danger. A dying animal loses heat, and a subnormal temperature is common before dissolution. Drugs which paralyze the heart cause a subnormal temperature. The poison of yew, and the self-eliminated toxin of milk fever, so called, have the effect of lowering temperature.

AVERAGE NORMAL TEMPERATURE

Animal.	Fahr. Thermometer.
Horse	100-101
Cow	101-102
Sheep	103-104
Pig	102-103
Dog	101-102
Cat	100-101
Fowl	105-107

LAMENESS—DIAGNOSIS OF LAMENESS

Many practical horsemen and stockowners who would not profess to diagnose bodily diseases, approach the subject of lameness with a misplaced confidence in their powers which is both amusing and embarrassing to the experienced surgeon, who is often unable to locate the trouble after exhaustive examination. After a life spent in veterinary work, the writer has no hesitation in saying that the correct diagnosis of lameness is the most difficult part of the surgeon's duty. Many a lameness is obvious enough, and the cause apparent, but there are a large number in which only a guess can be made. In the other parts of this book, in which the various causes of lameness are considered, the special symptoms will also be described, but we would ask the reader here, before studying particular lameness, to consider a few general signs which the doctor puts together in order to arrive at a conclusion as to the cause. Lameness is the language of pain, but the pain is assigned in many human subjects to quite other localities than the diseased structure. How much more difficult, then, is the diagnosis in animals, not endowed with human speech?

Because he is of greatest value and that lameness interferes with his work, we will take the horse as our subject, but what is said of him may be said with equal truth of other quadrupeds, although in some respects a lame sheep, pig, or dog will behave somewhat differently, and may be differently handled in view of his smaller bulk and lesser weight. A dog will make shift to run a mile or two while carrying one leg, but a horse or bullock similarly disabled makes a very poor show of walking a hundred yards, with three legs and a " swinger." If we attain a fair measure of proficiency in the diagnosis of lameness in horses, we shall not be much puzzled in ascertaining the cause in other species.

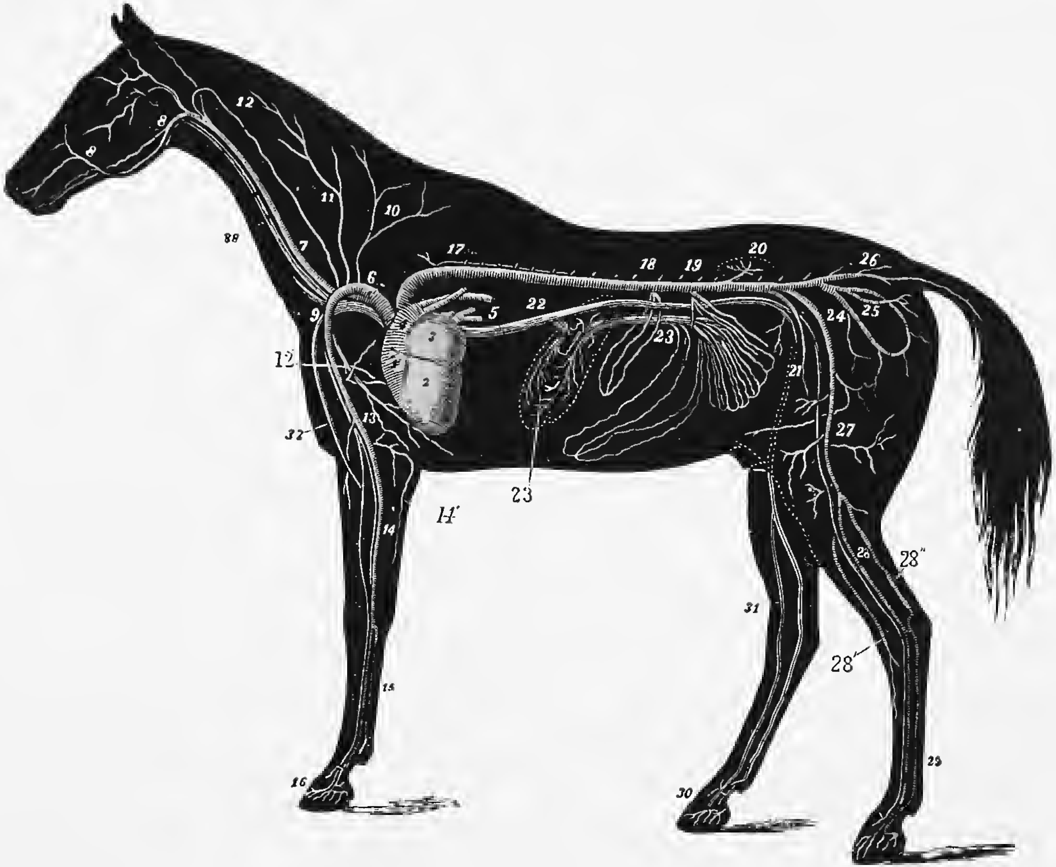
First we have to find out in which limb the animal is lame, and as I write this simple statement, a procession of coachmen, grooms, carters, and hunting, racing, circus, and other famous horsemen pass in review before my mind. They thought they knew as well as the average horse doctor as to which corner of the animal caused him to falter, but all these men I remember were doctoring the *wrong leg.* It will be more easily understood when we explain that they looked for lameness in the limb upon which the animal dropped. If you have a tight boot on you do not put extra weight on that foot, but transfer it as quickly as possible onto the other. This is what animals do. They stand upon four supports, but the weight is not equally distributed. Very much the greater portion rests upon the front limbs. The power of propulsion resides chiefly in the hind ones. A bent-kneed, shot-over animal in front, will often be a very fair performer if only his front limbs can be lifted while the hind ones propel his body. The four corners enable an animal to shift the center of gravity in a way that is denied to the biped. If a horse is very lame, say in the left fore foot, he will bring the right hind one further forward and impose more than a normal share of his body weight upon it: to the relief of the front limb. This will be particularly referred to in connection with fever in the feet, and navicular disease, which see, at pages 349, 353. This distribution of weight is not confined to the standing animal: he introduces the same principle when moving, and this is what makes it so difficult for the novice to differentiate between a slight lameness in a front or hind limb.

If the suspect of lameness is to be examined properly, he must be seen in the stable as well as on the road. We must approach him with the same careful observation as we should a sick animal: not disturbing his attitude or suffering anyone else to do so (the interested seller will arouse our suspicions by keeping the subject on the move). We want to note how he stands. He may have a front foot far advanced and the opposite diagonal brought under the body. This will suggest a foot trouble, for it is the habit of chronic navicular sufferers. If a joint knuckles over, we shall suspect weakness and mark that limb for careful scrutiny outside. If the vendor is too anxious about making the animal stand out and holds his head up, we shall look for bent knees, and if he interposes his own body between our view and the hind-quarters when the horse gets across the stall, we shall look out for spavin and string-halt. If we are not dealing with a seller but expecting a free hand if not actual assistance, we make the horse get across the stall first one way then the other and learn something by the way he lifts his limbs. Next we note how he comes out. If he is a heavy draught horse we observe with what facility he turns in a narrow space and if he groans, although backed out and with a fair amount of space, we shall presently want him to turn in short circles and back him to prove if his spine is right. It may be, but we are mentally noting things requiring special attention. Does he come out of the stable with short and hesitating steps? If so we again suspect his feet. The place is familiar to him and this apparent caution is unnecessary. Outside the stable we need a bit of level and, if we can get it, a hill as well. On the first part we have him walked away from us, while specially observing his general gait; and towards us, while noting the length of his stride. Next we have him trotted. On the outward journey our attention is given to his quarters, not his legs: we watch them to see if one drops more than the other, or recovery takes place more quickly in the one than in the other. This we shall observe again on a second or third trot. As he comes towards us we first watch his head, and if he nods it, we make sure that the man who is running him is not holding the bridle too short and causing the horse to nod towards the man for want of freedom. This has been called "bridle lameness." When a lameness has to be concealed, a little faking is done by holding the bridle close up to the chin and keeping the horse's head up. It may easily deceive the beginner, for a nervous animal can be bustled out of showing a slight lameness. Supposing a lameness is observed while the animal is being run, the examiner should abstain from using his hands until his observations of the form and manner of going and the defect of action has led him first to decide upon the limb affected.

By that time he will likely enough suspect some portion of it. He may have observed a short gait on coming out of the stable and an extension of the stride and diminution of the trouble with each run. He will then have strong suspicion of the foot. If the horse comes out apparently sound and becomes lame with exercise he will think of splint, ringbone, spavin, and ossific troubles. It may be taken as a broad rule that a foot lameness diminishes with exercise, and a bony or joint trouble increases. Rough indications of this kind reduce the field of inquiry. If the toe of a front foot is dragged or brought forward by an outward inclination, the shoulder or knee may be suspected. An anchylosed knee due to a high splint which has crept up, will be distinctly carried outwards instead of being properly bent, but, in a bad shoulder case, the animal seems unable to lift and bring the foot to the front. It is important to bear this in mind, as so many amateurs have conceived the very reverse, and speak of a horse being "shoulder tied" when he fumbles on his toes to save pain in his foot, and deem him lame in the former situation when he stands with extended limb in the stable. (See Navicular Disease, at page 353.)

Very little information will be obtained by the hand over the shoulder joint. It is covered with a mass of muscle, and unless the patient has been run into or collided with a door-post, or has matter forming, he will not flinch to ordinary pressure. Most horses show discomfort when the limb is forcibly raised, and many rear. For this test to be of any use, it is necessary to practice it on the sound, in order to form any just comparison. When the hand is passed down to the knee there is a prospect of feeling abnormal heat or swelling, but few cases of lameness are found in this joint. The tendons and ligaments can best be felt when the limb is held up in rear as one would do to examine the sole of the foot. Squeezing the tendons will tell us of a concealed thorn when we come to it, and any tenderness should invite further investigation when the foot is on the ground, and the eye can help the hand in detecting enlargements. While handling between the knee and fetlock, and with the limb bent, we have the best prospect of discovering a lameness due to a forming splint, as the relaxed structures behind the bone enable us to feel further round the cannon bone and compress the splint bones in such a manner as to make the horse flinch when we come upon the inflamed spot. We now reach the fetlock, and apply the same tests as to heat, pain, swelling, etc. The pasterns or portion between the fetlock and hoof may be the seat of sprain or fracture, of ringbone or sidebone, and these we can only recognize by knowing the shape and make of the parts in health. Increased heat and tenderness associated with lameness soon after being put to work will, however, enable one to diagnose many a case of the kind without an intimate knowledge of the structures. When we reach the foot, in which perhaps we have diagnosed lameness by the action, it is quite as likely as not that we can neither see nor feel anything amiss. (See Diseases of the Foot, to which a special chapter is devoted.)

The diagnosis of hind limb lameness is usually found more difficult by beginners than infirmities of the front limbs. The animal may be lame at any point between the hip and the sole of the foot. When nothing can be found, it is the custom to attribute lameness to the " round " bone, but some people mean by this the stifle or patella, and others the true hip, while a third lot of guessers point to the prominent bone in front, which is not a joint at all, and, curiously enough, causes but little lameness when broken, or " hip down," as it is called. The dropping of the quarter and the wasting of the haunch muscles may be a guide, as also the swinging of the limb, or difficulty of bringing it under the body, and of supporting its due share of weight. Stifle joint lameness may or may not be accompanied by swelling, but is always a cause of peculiar action, inasmuch as the limb is swung round in the arc of a circle in order to bring the foot forward. Standing behind or immediately in front of the animal while in motion, enables us to see this distinctly. Hock lameness is the difficulty with most of us. It is often easy enough to see that the hocks are not properly bent, but an animal may be lame without much loss of mobility, or have spavins and curtailed movement but not be lame. A rough-and-ready test for this joint is the raising of the limb forcibly until the foot nearly touches the belly, and holding it there for a minute or more, then suddenly letting it free, and causing the horse to move forward. In the majority of hock troubles, the animal is much lamer for this trial, but soon recovers, and the examiner must be quick in order to gain any information by the proceeding. We have said nothing of the obscure lamenesses of nervous origin, or those caused by blocking of blood-vessels, which puzzle experts themselves, but have perhaps indicated the general lines upon which lameness should be investigated. (See Particular Lameness, Foot, Bones, Fractures, etc.)



THE HEART AND CHIEF BLOOD VESSELS OF THE HORSE— *after Mégnin*

EXPLANATION

Blood-Vascular System of the Horse.

1. Heart, right ventricle
2. Heart, left ventricle.
3. Heart, left auricle.
4. Pulmonary artery.
5. Pulmonary veins.
6. Anterior aorta.
7. Carotid artery.
8 8. Glosso-facial artery.
9. Left brachial artery.
10. Dorsal artery.
11. Superior cervical artery.
12. Vertebral artery.
12′. Internal thoracic artery.
13. Humeral artery.
14. Radial artery.
14′. Cubital artery.
15. Great metacarpal artery.
16. Ungual branches.
17. Posterior aorta.
18. Cœliac axis.
19. Mesenteric arteries.
20. Renal artery (left).
21. Small testicular artery.
22. Posterior vena cava.
23. Portal vein.
23′. Hepatic circulation.
24. External iliac artery.
25. Internal iliac artery.
26. Lateral sacral artery.
27. Femoral artery.
28. Posterior tibial artery.
28′. Anterior tibial artery.
28″. Femoro-popliteal artery.
29. Metatarsal vessels.
30. Venous plexus of the foot.
31. Internal saphenic vein.
32. Cephalic vein.
33. Jugular vein.

CHAPTER I

DISEASES OF THE BLOOD OR SPECIFIC DISEASES

THERE is no classification of disease to which serious objection cannot be taken; no perfect system is possible of attainment, and we take the common view of specific or blood diseases as those known to be due to something which changes its character, alters its effects, and produces certain signs which have been recognized as diagnostic, or proof sufficient. Specific organisms with special features known to bacteriologists account for most of the diseases, probably all, but some are not yet identified. For examples of the one and the other we may take anthrax, with its comparatively large bacillus and the ease with which it may be cultivated; and rabies, so invariably fatal to man and beast, but invisible as yet to the most powerful lenses. What its subtle poison is we do not know, although we can dilute the virus by passing it through a series of animals, and eventually obtain one strong enough to give protection to an inoculated person, but not so powerful as to induce the disease itself. Immunizing sera will doubtless take a more prominent place in the medical practice of the future, and displace drugs as curative agents. The future of our flocks and herds will depend largely upon the elimination of infectious diseases by getting rid of the undesirables which have been proved by tuberculin and mallein testing. Yet other means will be found of rendering clean stock immune. At the time of writing these words, some of the leading pathologists in Europe and America are cultivating the abortion bacillus, in order to afford protection to unimpregnated heifers. If the reader will refer to Tuberculin (at page 40) he will understand the principle upon which testing materials are produced. It will be some time before the above preparations can be standardized and brought into use by the stockkeeper and general public, and we must meantime make the best use of the tools we have for to-day's work; hoping, but not waiting for better ones to be forged in the laboratories of scientists.

Anthrax.—Caused by the entrance into the blood of a germ called anthrax bacillus. No fermented food or bad drainage can cause it. It must be induced by this particular organism, but this is not saying that fermented chop and fouled drinking water does not offer a favorable breeding ground for the germ when once there. This subject of infection is a constant stumbling-block to the layman, who should bear in mind that disease germs, like seeds, must have a suitable soil in which to germinate and multiply. The spores of anthrax introduced into the States in hides from anthrax-ridden districts in South America, may cause the disease in the men who handle them, and in the wool sorters, and the refuse of the smaller tanneries in particular gets conveyed in manure and general house refuse into the country and does no harm so long as it is employed upon arable land, but on pastures where animals are grazed the spores will find ready hosts. This has been proved in Yorkshire, England, where Professor Axe traced the disease from the fields to its source. Trifling skin abrasions about the feet offer facilities for the entrance of the bacilli. Similar injuries to the mucous membranes of the mouth and sides of the tongue, or in any part of the alimentary tract, afford a portal, and it is possible that they may be taken into the respiratory system, and so find their way into the blood.

Anthrax shows itself in different ways. It may be localized in the tongue in horses, cattle and swine (glossanthrax), which swells enormously and turns a purple or black color, threatening suffocation if not relieved by the lancet, and perhaps by an opening in the windpipe (see Tracheotomy). A few cases of glossanthrax recover, and some farmers in isolated districts where no State law prohibits treatment, may think it desirable to adopt the above measures, and paint the affected part with crude carbolic acid, and administer stimulants with large doses of chlorate of potash: afterwards giving iron and quinine to build up the blood corpuscles. (See Table of Doses.) Sheep more often show it in the hind quarters, when it is not easily distinguished from quarter-ill (which see at page 15). All farm animals are liable to be struck in the internal organs, lungs and heart, membranes or abdominal viscera. When anthrax attacks very suddenly and proves fatal in a few hours, it has been called splenic fever, because the spleen is found after death to be decomposed, and its normally firm pulp converted into matter resembling tar, within the membranous coverings.

The symptoms, as the reader will suppose, vary a good deal with a disease having such different modes of attack, and according to the organ or structures smitten chiefly or first. The symptom common to all is that of shock. A deadly blow has been struck at the animal's life, the countenance wears an expression which all stockmen recognize, but none can describe better than the nurse who says her patient is "marked for death." If at pasture, the animal gets away from the herd or flock and stands with drooping head and dropped ears, shallow, rapid breathing, cold extremities and internal temperature much raised, as proved by introducing the thermometer into the rectum or vagina. So rapid is the course of anthrax in some outbreaks, that none of these symptoms are observed. The cow may come to the milking shed as usual, and while the milker is operating give a sigh or groan, sway to one side and fall upon him, if he isn't pretty quick to make tracks. The writer has seen this several times. The beast may previously have passed dark bloody stuff from the rectum, or it pours out while prone, and before death, which occurs in a few minutes. The grazing steer which appeared to be in perfect health when the stockman made his usual count may be seen an hour later with tail erect and eyes "in a fine frenzy rolling," charging madly at nothing at all, or disregarding a tree which brings him up short. His gallop only lasts a very short time, and he falls and dies in the manner already mentioned. Treatment is out of the question, and the laws of most States require notification and deep burial. The first thing of importance is correct diagnosis. There is really no other disease with the symptoms we have described, so that this should not be difficult, and as on ranches and away from cities microscopic examination of the blood by experts is not to be had, reliance must be placed on the behavior of the animal during life and the post-mortem appearances as presented to the naked eye. For the sake of the herd, the beast should be opened if there is doubt, and the black, tarry blood in some internal part, more particularly the spleen, will tell the tale. The only thing which might be mistaken by the novice is a great hemorrhage such as would follow a ruptured vein in the belly or chest, but then the symptoms during life would have been different. (See Bleeding and Hemorrhage, at page 393.)

If it has been necessary to open an anthrax carcass, the greatest care should be taken to avoid infection of the operators and the ground where the blood and matters have escaped. Fire is the best of all disinfectants, and a thick layer of red-hot ashes should be applied. In old countries in Europe, it is recognized how much loss might have been saved if carcasses had been burned in the past instead of allowing the bacilli to spore and come up again with a fresh growth of grass. It is of course some trouble to burn carcasses, but in many districts only the labor need cost anything if wood is plentiful. It may be well here to tell beginners how to set about cremation of heavy animals. The following directions are given by General Fred Smith, F.R.C.V.S., of the British Army, who has directed the operation in anthracoid districts in India and South Africa, and had exceptional experience in dealing with plagues.

"I use a trench dug in the form of a cross about ¾ feet deep in the center, and gradually becoming shallower as it reaches the surface of the soil; it is seven feet long each way, by ¾ feet wide, and the earth taken out of the trench is thrown in the right angles formed by it; on this earth the wood is placed. If two pieces of stout iron can be obtained to rest the wood upon, so much the better. A layer of big wood comes first, then the trunk, from which all the limbs and viscera have been removed: next more wood, and lastly the viscera, also well covered with wood. The pile is then set fire to, and the body of a horse can in this way be readily consumed in five or six hours. The object of the cross-shaped trench is to insure a draught whichever way the wind is blowing. The ashes are thrown into the trench, and the place filled in. If the body be placed whole upon the fire it will take about twelve hours to consume."

Lands known to be badly infected are not worth stocking unless the precaution is taken of inoculating by the Pasteur method for procuring immunization. The protection afforded is not very lasting, but there is a fair prospect of obtaining a much more efficient material.

Black Leg, Quarter-ill, Struck, Pook, Symptomatic Anthrax.—By the above and other names a disease is known which so often strikes an animal in the hind-quarter that it is most widely recognized under the second of the terms above enumerated.

It resembles anthrax, in the decomposition of the blood caused by it, but is proved to originate in a different organism. The bacillus of anthrax is not the same as that causing quarter-ill or symptomatic anthrax. A front limb or any portion of the body may be struck, and from the suddenness with which this occurs the superstitious in old countries attributed it to the god of mischief; and Puck degenerated in provincial English into pook as the name of the malady. It has a peculiar liking for certain species, and avoids others; color seemingly acts as deterrent, but the reason is not known. Experimental inoculation proves that cattle and sheep, goats and rabbits, are easily infected by the bacterium; that equines

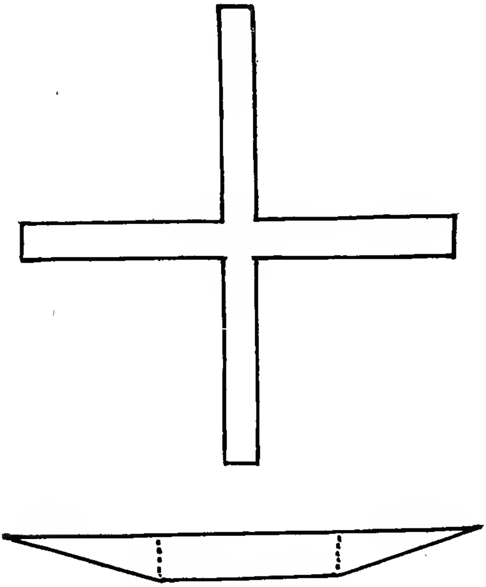


Fig. 2.—Trench.

and white rats only show a tumefaction or trifling swelling at the point of puncture, and that man and his friend the dog are immune, as are also the pig and the black rat. The manner of infection is believed to be through abrasions of the skin, particularly about the feet. The greater prevalence upon forests and undrained land may possibly be explained by the tendency of scrub and thorn and thistle to cause abrasions, as well as by the retention in the soil of spores which are believed to come up again as the result of earthworm migrations. The writer has often seen it in yarded animals in the winter when fed upon hay derived from pooky lands. Rough stuff of this kind containing many thistles, could of course cause abrasions on the mucous membranes and so give access to the bacillus, but it is not proved that entrance may not be afforded by ingestion, as with glanders and tuberculosis. Calves from six to eighteen months of age are the most frequent subjects of blackleg, but animals both younger and older may be struck. Young sheep—those of the first year—get it, and are said to be "jellied" when a great semi-fluid blood clot is found on the loin or in the haunch of the smitten animal.

Symptoms.—The struck beast is always found alone. If the herd has not left him, he has left it, for the instinct remains for all gregarious animals to separate themselves from their fellows when ill; even if the older one does not influence the herd to destroy a member who has become an encumbrance, and may lead to their being tracked down by beasts of prey. The animal looks sick, hangs his head, drops his ears, stands upon three legs, the "swinger" being the affected limb. If struck in the loin, he will be down, although he does not voluntarily lie down: on the contrary, he persistently stands, as if knowing that he would never get up again if he yields to the desire. This peculiar instinct runs throughout the larger animals, who have some premonition apparently, or it may be a survival of the fear of being overtaken by an enemy. A general loss of sensibility or condition of approaching coma is often observed. The animal has given it up. If the hand is passed over the lame limb, it will very likely come upon an area of skin under which gas has accumulated, and this gives a peculiar crackling sound when stroked with the fingers. It is not always present or readily found, because the struck portion may be deep-seated, but when it is discovered it is diagnostic, and the owner knows what to do; that is, to kill the beast without infecting the soil. Animals that have died of quarter-ill should be disposed of by fire, as recommended for anthrax (which see, at page 12).

Treatment is useless, although there is no blackleg district without its quack who professes to cure it—if called in time. He never is called in time. There are tales told in every region where quarter-ill prevails, that cases have been cured by boldly slashing open the affected parts, burning them with a red-hot iron, or dressing with pure carbolic acid. We have never been able to verify any of these cases, but there is little objection to the practice, because the animal is too comatose to be tortured by the remedy.

Prevention is what we must aim at. Whether setons and rowels, and bleeding and purging before turning out to pasture really have any effect, is open to doubt. The indirect evidence in favor of such practices is the observed frequency with which the most full-blooded and best thriving are struck. If setons are put through the dewlap, they should be frequently turned and dressed with turpentine or other irritant to keep up the mattering or formation of pus to act as an issue. (See Setons, at page 300.)

A far more satisfactory prophylactic is now to be had: an immunizing serum is prepared, and cords are saturated with it and supplied by veterinary druggists, so that the cattle man has only to insert them under the skin. The period of immunity is variously stated, but cannot be reckoned on for more than about six months, but it will be well worth the trifling expense twice a year in districts liable to this plague. The trouble of course comes in on ranches where rounding up half-wild stock occupies a lot of time.

Purpura Hemorrhagica, Big Head.—Sometimes called big head, but for the most part unknown except to veterinary doctors, this blood disease is marked by circumscribed swelling under the skin, and gravitating to the lower parts as time goes on, giving an appearance of dropsy. There is always blood-staining in the mucous membranes of the nostril or eye, and the presence of these extravasations characterize the malady. Little spots or big ones, they are practically bleedings into the tissues, but are best seen by opening the nostrils of the horse. It is supposed that some blood destroyer enters the circulation, and causes the disease of the red blood corpuscles in some such manner as Texas fever does in cattle when bitten by infected ticks. (See Texas Fever, at page 20.) There will probably be found some cousinship between red water and Texas fever, purpura and scarlatina, perhaps also between those diseases which cause the disappearance of the red blood corpuscles by enemies of the microscopic order. (See Pernicious Anemia in Sheep.) Unlike anthrax and black leg, where to the naked eye somewhat similar blood decompositions occur, purpura offers fair prospects of successful treatment. The swelling of the head is sometimes enormous, and the poor brute looks more like a hippopotamus than a horse. Along the belly great enlargement occurs, and the limbs, or one of them, may become elephantine in proportion. Still there is hope of cure, although of course many die that are not early taken in hand, or have constitutional diseases which have robbed them of vitality, as latent glanders, tuberculosis, etc.

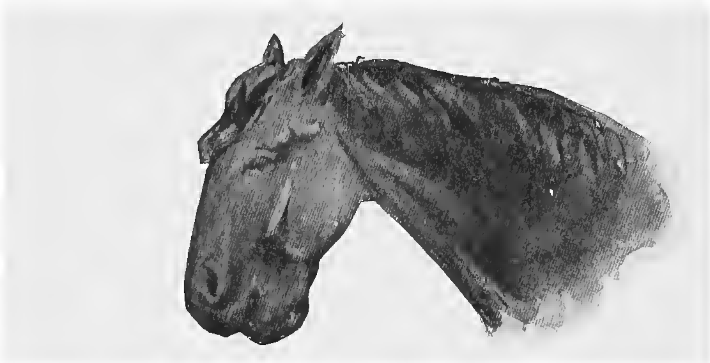


FIG. 3.—BIG HEAD.
Head Swollen with Purpura.

Although we have seen this disease on the open prairie, it much more frequently occurs in dark, dirty old city stables where no sunshine penetrates,—conditions inimical to treatment, which must be conducted in the purest obtainable air with good dry floor and plenty of bedding of the same quality. Clothing in cold, wet weather, and bandaging the extremities, is preferable to artificial heat, which almost certainly impairs the purity of the atmosphere.

Flies must be kept out in summer, and everything that can annoy the sufferer. The too common practice in hot belts of darkening the stable will not do in this disease. A dollar's worth of loose muslin, such as cheeses are wrapped in, could be stretched upon light wood, such as tile battens, and cover many doors and windows with no more work than can be done in a couple of hours by any man with a saw, a hammer, and some inch tacks. For foods, gruel and milk and eggs beaten up, carrots and other roots, green meat or bran, and linseed mashes (see Sick Foods, page 418).

Alcoholic stimulants are much favored in this disease and seem to hold up the patient for a time, but must not be persisted in. Two or three ounces of rye whisky, night and morning, may be given in gruel for three days, and in addition, an ounce to two ounces of spirit of turpentine twice a day, cow's milk being a good medium unless there is constipation, when advantage may be taken of linseed oil as a still better vehicle. Half-ounce doses of potassium chlorate are believed to give the needed oxygen to the blood, but of all remedies iodine has been found the best, and it is administered through the windpipe in the same way as for Husk (which see, at page 403). A mixture is made of one dram of iodine crystals, six drams of potassium iodide, and eight ounces of water. The dose to be given, half an ounce, or one tablespoonful, twice a day. This presupposes the possession of a hypodermic syringe. Such an instrument should be in the possession of every stock-breeder and keeper, as it has many uses which will be referred to at other pages, and gives the owner advantages in a variety of cases where oral administration of medicines is not practicable, or would entail delay; for example, the hypodermic injection of remedies in acute

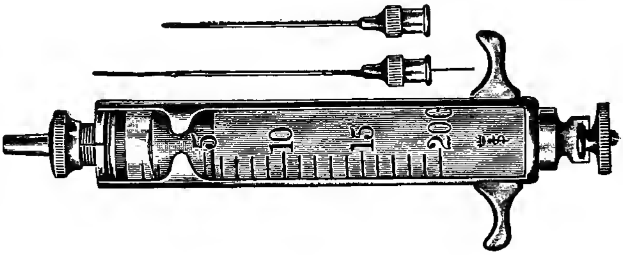


FIG. 4.—HYPODERMIC SYRINGE.

colic, where the animal may die before an aperient given by the mouth can possibly act.

For bathing the swellings, a lotion at once soothing and antiseptic can be made of vinegar and water, or very dilute carbolic oil, over skin that seems very tight and unable to yield to the pressure from within. Some horses are lost by suffocation through the pressure of throat swellings, and in the absence of anyone capable of performing tracheotomy. This comparatively simple operation will be found described at page 168, in connection with Laryngitis (which see, page 164).

Texas Fever, Red Water, Black Water, Muir-ill, Hemoglobinuria.—Until within quite recent years, no suspicion was entertained as to the identity of Texas fever with red water, which has been known as long as herds have had scribes to mention them. American investigators have come to the same conclusion as those in South Africa and in Ireland, namely, that red water and Texas fever are conveyed by infected ticks. There are minor differences in the manifestations of the disease in Texas, in Ireland, and in South Africa. There are different ticks and climate also. The Australian ticks have their own peculiarities, one of them being a concentrated cussedness unknown on any other continent. Mr. Stockman's experiments in South Africa, confirmed by other observers in different parts of the world, give us results more important than an infallible recipe for cure could be. We now know how to prevent the disease, how to rid infested land of it. Despite the curious fact that an infected tick passes on the capacity for infection of beasts to its pupæ, there is a time limit, during which ticks, like other things, must feed or die. They are marvelous creatures in accommodating themselves to circumstances, truly; for they can pull in their belts, so to speak, and postpone the question of dinner for months, and then fasten on an animal, and so gorge themselves as to lose their hold and fall off. They can be sent flat in a letter round the world, and come up smiling for a feed, but it has been ascertained that fifteen months is the limit of time during which they can subsist without a host. Taking advantage of this information, many immigrants into South Africa have taken over farms abandoned by Boer farmers as hopelessly infested with red water, and the disease has not reappeared unless stock has been introduced from an infected district. Starving, then, is the remedy against ticks; but the farmer must not starve also; he must put other stock on the land that the parasites will not attack. Arable land, or such as can be put under the plough, will present no difficulty, but there are circumstances, such as those of the Eastern States dairy farmer, whose living depends on supplying the cities with milk, where it is difficult to change the system. A part of the land can be dealt with at a time, however, as it is found in closely fenced countries like Ireland that ticks have remarkable limitations, red water occurring in one field at frequent intervals, and not in the next, although it seems absurd to suppose that a hedge, a fence, or a gate could act as a barrier. The fact, however, remains that there are hundreds of farms in the British Islands where a sharp line of demarcation exists between red water fields and those which do not produce it. This gave rise to the idea that drainage had something to do with it, together with the fact that undrained lands and forests provided more cases for the veterinary than old pastures. The explanation is to be found in the greater opportunities on scrub and bushes for the expectant tick to alight on his intended host. In South Africa a number of baths and washes have been used to kill ticks, and their numbers, and therefore their effects, have been by such means reduced, but the plan is ineffectual, because washes that are strong enough to kill the parasites are dangerous to their hosts. Starve them out.

Symptoms of red water and Texas fever may be taken as the same, subject to variations, as we have above said. The subjects of it are poor stores, or debilitated young animals which have been dragged up on milk substitutes, rather than reared in a fair way, and cows after parturition. This points to a debilitated state as predisposing to the disease, and suggests that robust animals may be bitten without becoming infected. A listless and dejected appearance marks the invasion of red water, a high temperature at first, a weak, irregular pulse, quick, jerky breathing, and in cows a sudden falling off in the quantity of milk given and very often in its color, which is stained a dirty brick red. There is constipation, loss of appetite and cud, with diarrhea later. Arching of the back and frequent posturing as if to urinate without doing so, may be noted, and presently, when urine is passed, the characteristic discoloration confirms the diagnosis. Red water is to be distinguished from bloody urine. It is not blood mixed with it, but broken up blood corpuscles which have been deprived of their chief coloring, or the latter is so diluted as to impart to the fluid a dirty red purplish or even black appearance. Wasting and diarrhea follow, and the patient succumbs in many instances. Some spontaneous recoveries occur, but treatment offers a fair prospect of success in most cases, if taken during the period of constipation. Some difference of opinion exists among doctors as to the best treatment, but the majority of practical men with experience believe in a good purge to commence with. An ounce or two of aloes, an ounce of ginger, two ounces of nitre, and a pound of magnesium sulphate, is a favorite drench; so also is a pound of salt (sodium chloride), that most ancient of antiseptics which has not " lost its savor," but apparently acts as a true disinfectant in the blood, destroying the organisms which decompose it. Turpentine spirit has much the same effect, and is prescribed in this disease, in purpura hemorrhagica, and other blood dyscrasiæ. It is a valuable, cheap and good-keeping drug which every lone homestead should have in stock. Further treatment consists in giving two ounces or more of hyposulphite of soda, in two or three gallons of hay tea or thin gruel, to drink twice a day, and if the bowels are disposed to harden again, linseed oil in small and repeated doses. Some promising cases up to a certain stage prove a disappointment, by relapsing into a condition of such extreme weakness, that alcoholic or ammonia stimulants must be employed, such as a gill of whisky in a quart of milk, or four drams of carbonate of ammonia in a quart of water, or a mixed cordial, perhaps better than either of the foregoing, and consisting of the following ingredients: an ounce each of ginger, gentian, and pimento, and an ounce of mustard, given in a quart of warm ale or water. This can be administered three or four times in the twenty-four hours.

Sour lands in Britain, where red water has been rife, have been quite free from it after dressing with ten cwt. of salt to the acre. If red water, like Texas fever, is always tick-borne, the explanation of immunity conferred by salting the pasture is not apparent. It may be found on further investigation that some other intermediary bearer exists, and of a soft nature susceptible to salt, as are all the molluscs, in solutions as weak as one per cent. (Try the experiment in an ounce of salt and five pints of water with garden slugs and snails.)

Azoturia—Hemoglobinuria.—For some diseases we have no popular names, and for others too many, and some of them so misleading. The above belongs to the first order. Horses are the subjects. It comes on suddenly when a well-thriving and rested horse comes out of the stable and commences a journey. He suddenly falls lame behind, drops as if a bone was broken, breaks out in a sweat, looks the picture of anguish, and is with difficulty got to the nearest stable. Because mares were first observed with this affection, it was called hysteria; but they are not the only sufferers. The loin muscles are in violent spasm, and the fetlocks are overshot: indeed, many have supposed that the horse has trodden on a nail, until further examination has shown that the foot is not injured. Very strong-smelling, high-colored urine is passed, having a deep red tinge but not like the red water of cattle, which is thin in substance however dark in color. We have said the subjects are well to do, and may add that they have been corn-fed and become full of rich blood and products of waste tissue, which remain inactive until some form of exertion calls them forth, with the results above described. Death may follow in a few hours, or the patient may remain more or less paralyzed, or recovery, early and complete, may result from proper treatment.

Treatment.—This is one of those diseases where the well-informed amateur will save his horse's life, in all likelihood, by immediate resort to the lancet, taking two to six quarts of blood from the jugular vein (see Bleeding, at page 375), and the administration of a ball of aloes of five to seven drams. It may be necessary to support the animal in slings. (See Methods of Control, at page 413). Bran mashes and carrots, cut grass or green maize, linseed and other laxative foods should be given, and the patient encouraged to thin his blood with as much water as he will take. An ounce of bicarbonate of potash in each bucketful for the first two days will help the process, or half an ounce of bicarbonate of soda and a dram of nitre. A large poultice along the loins may be made of spent hops, mangels, carrots, turnips, or other roots, if linseed and bran are not to hand. A pillow-case comes in very handy for this purpose, but the housewife is not the first to propose it. A warm liniment of camphor and oil will soothe, but no turpentine, ammonia or Spanish fly should be used, as they may be absorbed; a remark that applies to mares in use, or at oestrum. A horse that has had this trouble should have an aloetic ball at spring and fall, if not once during summer and winter.

Braxy in Sheep. Louping Ill.—The writer has not met with this disease in America, but in such a vast country it is probable that it is to be found. It is only in quite limited areas of Europe that it occurs, as in the North of England, the West coast of Scotland and West of Ireland. There is no doubt that many diseases have been mixed up under the names above given, and those of "striking of blood" and others too local to be of interest to American readers. It is, however, in Scotland that the disease has been best studied, and to Professor Hamilton of Aberdeen and Principal McCall we owe our present knowledge of its causation, and the best course to pursue in its elimination from the flock. The distinctions made by shepherds between red braxy, white braxy, and water braxy are of no consequence; they merely mark differences of degree, or else of duration. The malady has been proved to arise from infection by the specific bacillus—the Braxy bacillus—which chooses subjects under a year old in nearly all instances. November, January and February are the months in which it is chiefly manifest. It used to be said that the victims nearly always die, but it appears from Professor McCall's experiments and investigations that "young stock on an infected farm, not showing marked symptoms of the disease, have during the months preceding its appearance in the virulent form, passed through a mild attack, and thus acquired a natural immunity." The death-rate is from ten to forty per cent. among the young. Two-year-olds seldom suffer and three-year-olds are believed to be quite immune. The bacilli are found in great numbers in dead subjects, in the mucous surfaces of the fourth stomach and the small gut. The symptoms are a short, stilty step as if trying to walk on tiptoe, an unnatural restlessness, suddenly lying down and quickly rising again, as if uncertain what to do next, but moved by some disquiet spirit. This excited condition gives place to coma or a fatal lethargy, the sufferer having separated himself from the flock. The lowered head is accompanied by hurried breathing and high temperature, the thermometer indicating as much as 105° to 108° Fahr. The rapidity with which putrefaction of the carcass is observed to follow, is not due to ordinary causes, but to the Braxy bacillus. The first three compartments of the stomach are found empty after death, and the last contains a brown fluid in which the bacilli are innumerable. The Scottish system of sending the young sheep away, is attended with much expense but answers fairly well for the dangerous months. Professor Hamilton has obtained a culture of the bacillus, which can be given by the mouth and will afford practical immunity. It is made from bacilli of the danger period, and the lambs to be immunized are fortified by a mild attack.

Cattle Plague.—Always present in the steppes of Russia, this fearful disease from time to time breaks bounds, and crosses frontiers so jealously guarded that a cigarette cannot be smuggled. Parts of China also are included as its permanent habitat, but in these countries it takes a less malignant form. Wherever it has been carried into new countries, its effects have been disastrous. In South Africa something like fifty per cent. of the cattle were swept away in the early years of the present century. Natives will hide cases from the police, and a fresh scourge may at any time afflict the much tried white inhabitants south of the Zambesi. The quarantine regulations in America, and indeed in all civilized States, afford a large measure of protection, and if an outbreak is followed up and immediately surrounded, the slaughtering-out system proves effectual. Only the expert can pronounce, and we need not therefore describe the malady in detail, but offer advice which will be often repeated in this volume, namely, to separate immediately any animal with a disease unknown to the owner, and to keep suspects or in-contacts away from the herd while seeking professional advice.

Foot and Mouth Disease, Murrain, Epizootic Aphtha.—This was described by French and German authorities as long ago as the middle of the eighteenth century, but it was a hundred years later introduced into England, and probably from thence to America, as at that time pedigree stock was being imported largely from Britain, and the breeds from the European continent had not become famous in the States. A micrococcus has been found in the vesicles or bladders, but it is not certain if this particular organism is the pathogenic one, or immediate cause of infection (see page 1).

Symptoms.—The trifling signs of fever may escape observation, but there is a rise of temperature, accompanied by slight rigors or shivering. The first thing to attract attention generally is a dribbling of saliva from the mouth, which practical stockmen know may be caused by a variety of things, and so not call for special notice. This is unfortunate, since it is of the greatest importance to detect the disease and isolate immediately. The possibility of this malady being brought on to the farm by a stray cur or a wild animal when no one is thinking of it, should be additional reason for that examination of the mouth which is advocated in connection with the diseases of the teeth, tongue, and disgestive system, in another place. Vesicles or water bladders already formed, some perhaps broken and showing ragged sores (ulcers), and some in the papule or pimple stage not yet containing fluid, will most likely be found in close proximity in a case but two or three days old. The pad of the upper jaw where there are no teeth corresponding to the incisors below, is their favorite situation, but they may be found upon the tongue, the gums, and part of the oral cavity. Between the digits or claws, and extending round the coronet of the lame foot, will be found similar eruptions in a typical case; but the foot trouble is not always developed, and in its absence, foot and mouth disease has sometimes been mistaken for simple aphtha, such as driven sheep get when compelled to graze on dusty and sharp-edged coarse grasses. The latter eruptions are more confined to the muzzle and look more inflamed, and do not contain the same clear fluid that the infectious eruptive disease displays in the early period. This disease, like many other infectious ones—pink eye, for example—varies in its degree of infectivity and the severity of its manifestation in different outbreaks. At the time of writing, it has become quite a mild affair, and cattle need only to be kept in healthful conditions, given a dose or two of saline medicine, and the ulcers dressed with alum lotion, in order to recover quickly: but we may not do as we like; the State law must be submitted to. As this varies in different countries, we will only say that the British system of stamping out has proved best for a country with no land frontiers, though the authorities did not learn this until millions of dollars' worth of damage had been done.

Glanders and Farcy. Fassy. The Fass, Etc.—(Mallein Test).—The bacillus malleus is the organism responsible for glanders. Nothing else can cause it; but the difficulty of tracing infection led old observers to suppose that it might be induced by hardships such as are endured in campaigns and on board ship. Heat and cold, exposure, starvation, stifling atmosphere, loaded with carbonic acid, and the fecal products which accummulate in a ship rolling in bad weather, when cleansing is wellnigh impossible, undoubtedly contribute to develop the disease when it is latent in the system. The writer was engaged in transporting horses from America and other countries to South Africa in the war at the beginning of this century, and saw only too plain evidence of the fact, but there was always the glanders bacillus lurking in the system; the hardships developed the disease. The organism may be taken in the food, in the atmosphere inspired, or in the water, and in a few cases no doubt through abrasions of the skin. Of the latter of course we have proof by inoculation (see Mallein Testing, at page 29).

How long the bacilli can live and remain infectious outside the body, is as uncertain as the climatic conditions which exist around it, but there is good reason to know that its presence is permanent in some old stables in great cities where there is a succession of animals infected. Although glanders is classed as an equine disease, it should be understood that man can be infected, and that fatally; a number of deaths occurring annually in England, most of them taking place in London and Glasgow, where the buildings are old and unsanitary, and unfavorable to man and beast alike, and the persons employed are often reckless and ignorant of the risk they run in handling horses with a chronic nasal discharge. Mules and asses, lions and tigers, goats and guinea-pigs, are all susceptible to the disease: the last named being generally employed for testing when men are glandered, and the discharges are taken to make cultures from. Mr. Hunting's experiments with dry and moist glanders matter, lead to the conclusion that when exposed to a moist atmosphere the virus quickly loses its vitality, but that dried matter is capable of infection up to six weeks. Again, the bacillus thrives best in cultures maintained at about the temperature of the horse; higher or lower, it becomes weakened.

The symptoms are fairly easy to understand in a well-developed case, there being a discharge from one or both nostrils—more often the left—and typical ulcers inside. Inflamed looking and somewhat hard pimples at first, they presently develop into raw and more or less ragged holes (ulcers) in the surface of the Schneiderian membrane. The examiner must not mistake the opening of the tear duct (lachrymal duct) for an ulcer, as seen in all horses close to the margin where the reflection of skin terminates in true mucous membrane. A healthy horse should be examined, looking on the floor of the nasal chamber for this orifice, which has indeed nothing in common with an ulcer when once compared. The matter running away from the nose varies a good deal from a transparent tenacious mucus to a mixed pus-like material, and it cannot be said that any nasal matter is positively diagnostic. It is the ulcers which decide the case. Then there are swelled glands under the jaw adhering to the bone, which is not the case with healthy glands. An acute case may become chronic. A certain measure of restoration to health, and abatement of the symptoms, as with human consumptives, has given false hopes of complete recovery, or disarmed suspicion as to the true nature of the malady. It is these chronics, able to work, and associating with other horses, which do the mischief, as they continue to be infectious. There are cunning old horse copers who keep the disease in check by administering copper, iron, and arsenic, in doses we had better not state, but the doubt can be set at rest in most of these cases by giving a bold dose of aloes in a ball. That will often bring it out, and used to be the general test before the days of mallein, and in the absence of a cheap ass to inoculate: the latter being highly susceptible. In our opening remarks, we mentioned the lurking bacillus awaiting favorable opportunity, and have now considered three forms of glanders, the latent, the acute, and the chronic. There is yet another form, that of cutaneous or surface glanders, which in all old books is described as farcy, and treated as a separate disease. It is glanders showing itself in the lymphatic vessels, and the so-called farcy buds are centers of inflammation around the valves of the lymphatic vessels, or at their junctions. The matter of a farcy bud will produce glanders in some horses, and the glanders discharge will produce farcy in others inoculated: it is one disease. This form was even more successfully treated before the days of compulsory notification, than systemic or acute glanders. The student must be warned against mistaking two other quite different diseases for glanders farcy. It is much to be regretted that old names in popular use add to the confusion of the beginner in veterinary studies. The name of farcy, or of water farcy, is frequently given to an inflamed and swollen leg due to inflammation of the lymphatic vessels, and to a somewhat similar condition arising out of a chronic form of eczema. (See Inflammatory Edema or Monday Morning Leg and Grease, Eczema Impetiginodes, at pages 30, 261.)

Mallein Test.—Cultures made from the bacillus malleus are employed to detect latent glanders in the same way as tuberculin for the discovery of tuberculosis in cattle (see Tuberculin, where the method is described), but with a far greater certainty. The mallein test in the hands of an experienced veterinary surgeon is very little short of certain. This seems a strong assertion, but I learned it trembling, so to speak. Large studs of valuable horses were entrusted to me to put through the mallein test, and, without any outward or clinical signs, I had to sign the death warrant of many of them, and await the official post-mortem examination which was to confirm or upset my decision. In no case did I get "left." Other practitioners entrusted with similar powers exercised the same caution in putting back doubtful reacters into a separate stable to be again tested at a later date unless, as frequently happened, the suspects were sent to auction sales without our knowledge or at least without our consent. The unloading of suspects, many of which had latent glanders, was the means for some years of spreading the disease, and in London (England) finally led to drastic measures being passed for the suppression of the disease. Inoculation is followed by a typical swelling around the seat of puncture and an increase of bodily temperature, but this is a performance which should be left to the qualified practitioner, as his certificate will alone be of value in law.

Lymphangitis, Weed, Big Leg, Monday Morning Leg.—No great objection need be taken to the names following the first and scientific definition of the disease we are about to consider, but the name of farcy and water farcy has been given to it and is a misnomer leading to much trouble (see Glanders and Farcy, at page 27). An acute inflammatory swelling of a limb, generally a hind one, but not rarely a fore leg, occurs in well-fed horses after a spell of rest, hence the name Monday Morning Leg, for the rest of the previous day favors the development of the trouble. Brewers'

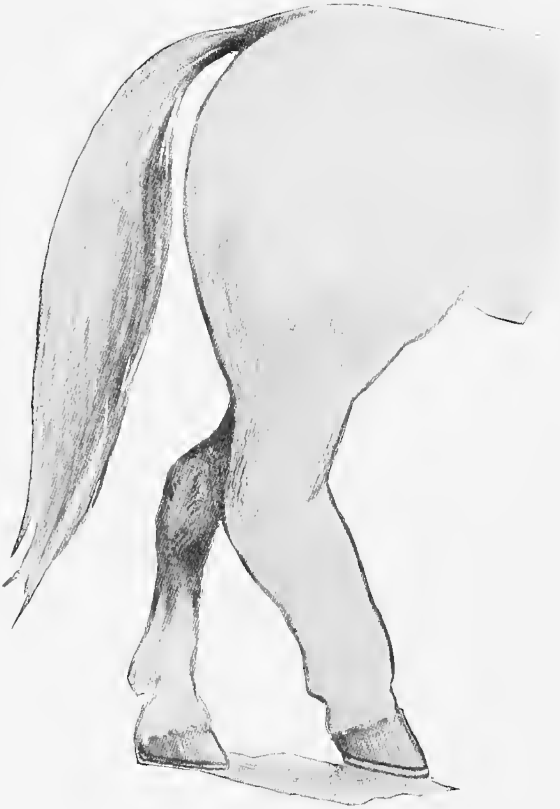


Fig. 5.—Monday Morning Leg.

horses, millers', and such as are used for heavy draught, and are allowed beans as well as corn in plenty, are the most frequent subjects, but the buggy horse only used at week-ends and standing idle most of the week is also a sufferer. The rich products in the lymphatic vessels accumulate, and inflammation sets in. The horse is found in the morning quite stiff, no preliminary febrile symptoms being observed, because they have occurred in the night. He cannot get over in the stall for mucking out. He blows and trembles when made to move, and seems as if rooted to the ground. Very likely his back is up, as he will get the sound limb far under his belly to take the weight its fellow can no longer sustain, and the attendant may report him as hurt in the back and unable to move. When the limb is examined, the swelling will be found to extend some distance up the leg, to be intensely tender to the touch, and as if a cord had been tied round in an oblique direction from the upper part of the swelling; the limb above being apparently quite as usual. While the temperature is up, and the pain acute, appetite is often indifferent, but the animal should be offered bran mashes and given a bold dose of aloes in a ball; for a heavy draught horse of the Percheron or Shire breeds, six or seven drams; less of course for a hackney or carriage horse. Warm fomentations relieve the pain and are more anodynous in effect if a dram or two of extract of belladonna is rubbed down with the water employed. The leg should be gently mopped with a soft towel, and then liberally dressed with one part of strong solution of lead (liquor plumbi of the U. S. Pharmacopœia) in seven or eight parts of linseed oil. This gives much relief to the tense skin, and prevents drying too rapidly. No hard corn or dry hay should be given until the physic ball has acted (see Physic, at page 363). In a couple of days the worst symptoms abate and the question of exercise arises. If the animal can be induced to move a few steps he will soon improve in mobility of the limb, but must not be made to use it long enough to add to the inflammation. A little exercise facilitates the absorption and removal of the effused fluids, and lessens the probability of a permanently enlarged limb (see Elephantiasis). A cheap lotion with which to continue bathing daily, may be made by dissolving an ounce of sugar of lead in half a gallon of water and adding an ounce or two of glycerine. Small doses of nitre, as one to two drams night and morning, help to carry off the products of inflammation, by exciting the kidneys to extra work. Exercise should be increased daily, but the convalescent should not be put to work until the limb is quite cool and he has been restored to two-thirds of his usual ration of corn, oats and hay; withholding beans for a time, and, ever after, using them very sparingly. There is a simple drug which is almost a specific for the prevention of lymphangitis. It will help when established, and prevent the recurrence of attacks. Epsom salts (sulphate of magnesia) is the remedy, in doses of two to six ounces in a bran mash once or twice a week. Besides this medication of horses prone to big leg, an aloetic ball should be given three or four times a year. No long spell in the stable should be allowed. If no work has to be done, take the opportunity of physicking, and reduce the ration.

Elephantiasis or Big Leg.—In the previous pages the principal causes of a permanently enlarged leg have been dealt with, and a means of prevention suggested. Despite these precautions, successive attacks are apt to leave the limb thickened. The chronic form of eczema known as grease, also has this effect. It is not to name a remedy that the matter is here referred to, since none can be found for organized tissue, or fibrinous deposit between the skin and the tendons of the leg, but to urge on the reader the importance of using all the means advocated in the article on lymphangitis to prevent an unsightly limb, which depreciates the animal's value either for keeping or selling. True elephantiasis as seen in man does not occur in animals.

Pink Eye, Influenza.—When this disease first appeared in America the peculiar pink coloration of the conjunctival membrane offered the time-saving people a new name for it; but Europeans call it influenza, spelling it in half a dozen different ways according to their nationality. Like the affections we have already mentioned, it is due to a specific bacterium which has been cultivated and passed through rabbits, mice, and pigeons. It is scientifically described as an infectious febrile epizoötic disease of horses, affects primarily the respiratory tract, but further involves the nerve centers, the circulatory system, the mucous membranes of the digestive apparatus, the eyes, and subcutaneous structures. It is communicated both directly, indirectly, and by inoculation with the exudate. The ass and mule, as well as horse, are subject to it, but it is not communicable to man. Many stablemen hold a different view as to its infectivity to man, but it should be remembered that human influenza has generally been rife at the same time.

Symptoms.—Having regard to the numerous structures which may be affected, these will necessarily vary considerably. A lowered vitality is common to all. The animal is evidently ill, as is seen by his manner before he is closely approached. The attitude is one of gloom and depression of spirits, he is not interested in the sifting of corn or the clanking of the water bucket, and does not paw impatiently to be served first, or whinny at the approach of the feeder. The hanging head and drooping ears invite further examination, and then the pink eye will be seen if the lids have not already swollen too much to give a view. They can always be parted by the finger and thumb, and then tears will run down the cheek. The temperature taken at the rectum will show two or more degrees of elevation; the extremities will be cold or variable; the hair will stand up and feel harsh, where not rugged up. These symptoms are common to most cases, but others will depend upon the organs chiefly affected. In certain outbreaks the pulmonary form has been prevalent, in others the nervous, while a rheumatic paralysis of the muscles has been the special feature in some years. The reader is therefore referred to the above diseases. The treatment will be the same, although originating in a specific infection. It is important to recognize the first sign of influenza, and take no risks. If possible, isolate the case. Give a good loose box, dry bedding, a warm but not hot atmosphere, clothing and bandaging and hooding for body, legs and head. (See Sick Nursing, at page 418.)

If the first shock can be met by diffusible stimulants, experience shows a better rally to follow. Doses of two to five ounces of whisky, with a dram of quinine, have given good results, and may be followed by ounces of tincture of gentian in water, or balls of quinine, gentian, and other bitter vegetable tonics (see Medicines, at page 513), if there are no sore throat symptoms, when balls should never be prescribed (see Electuaries, at page 442). Where no separate building for isolation is possible, a sheet saturated in disinfectant should be hung between the patient and other animals. The patient should be made as comfortable as possible, bathing the tear-stained face, and anointing the skin with any simple ointment to prevent scalding or loss of hair, but the swollen eyes are best let alone, as the lids protect the sight from light it could not bear, if they were open in the usual way. No bad results to the sight seem to follow, the conjunctival membrane alone seeming to be involved.

Dog Influenza.—This malady differs in its manifestations in perhaps a greater degree than in the equine form previously considered. The gay dog loses his natural vivacity, and the depression is soon followed by vomiting and an insatiable thirst. No sooner has the copious draught been swallowed, than the dog retires to bring it up again. At first the ejected fluid consists of mucus with many air bubbles and much froth, and it may be yellow with regurgitated bile which has come into the stomach from the small intestine, instead of passing on its way to keep the contents of the bowels from fermentation. Streaks of blood appear in the later vomits; an offensive odor denotes gangrene, and death then follows. Inflamed stomach or a specific form of gastritis, is the usual way in which influenza so-called affects dogs, but the gastric has given place to the nervous and the pulmonary in other years, and we have seen pneumonia, dysentery, paralysis, and all the symptoms of acute muscular rheumatism at different times; all arising out of this infectious disease of dogs, which has perhaps more conveniently than correctly been named dog influenza.

Treatment.—We have the advantage with dogs, of greater control than with horses. We can put them to bed in a cosy corner, and if there is not a devoted mistress, there will most likely be a kind-hearted woman to whom a dog's illness instantly appeals, and who will "make his pillow in his sickness," and offer those kind attentions which dogs most, if not alone, of all animals appreciate. The love of admiration common to pet dogs will often induce them to take beef tea and other things they would rather not, and this special trait in dog character should be taken advantage of to the utmost. We have, however, observed that in the early part of the attack very little good is done by any nourishment, and that to allay the sickness by one to three drops of hydrocyanic acid (dilute) in a teaspoonful of soda-water after each vomit, is most effectual and should be followed by a few drops of brandy in soda-water. In giving spirits to dogs one may here call attention to the common mistake of making dogs drunk with teaspoonfuls or more, before sending for the doctor. I have often been to see a tiny pet of four or five pounds, which has been drenched with one or two spoonfuls of brandy or rye whisky overproof; indeed, the alarming symptoms (of intoxication) following have often been the reason of sending for professional assistance at all. Five to ten drops of spirit in carbonated or so-called soda-water is a gastric sedative and mild stimulant to the exhausted animal, but large doses of alcohol are followed by a depression corresponding to, or greater than, the elevation of spirits enjoyed by the patient for a short time. Our readers are of course all strictly temperate people, or we might enforce our argument by references to human experience. From this morally shocking subsistence on brandy-and-soda we pass on to milk-and-soda. There is a persistent acidity of the stomach which will curdle and reject milk alone, and we are anxious to wean our patient as soon as possible from alcoholism, although we have no reason to fear that he will draw corks or discover beer barrels and "suck the monkey," and finally attribute his bad habits to the doctor who first prescribed stimulants. From milk to mutton broth, beef tea, light puddings, and white meats, the convalescent gradually gets back to his ordinary food without the risk of gastric irritation recurring, which it probably would if he were allowed a full meal the first time he cares to take one. Pulmonary complications such as inflammation of the lungs (pneumonia) are to be treated on the general principles laid down at page 177. A peculiarity of the spinal attack in dog influenza, is that the temporary paralysis is of a kind due to congestion, and needing sedative treatment at first, small and repeated doses of the bromides of ammonium and potassium, withholding the spinal stimulants or tonics until later, then nux vomica and strychnine, confer great benefit. Reference to the Table of Doses at page 496, will show that dogs take very much less nux vomica and its alkaloids than do other animals in proportion to their size, or body weight. The large brain and highly nervous temperament of the dog puts him on a different plane intellectually, and in respect to nerve stimulants, physically also. Warm flannels frequently renewed and placed on the lumbar region, are advised, and massage with soap liniment, which may be fortified with a little turpentine.

Rabies, Madness, Hydrophobia.—The most awful malady of dogs and men is rabies or hydrophobia. In the dog it is called rabies; in the man hydrophobia; a distinction it is well to keep in mind. A mad dog does not fear water, and is not thrown into paroxyms by the sound of it. Some, but not all human sufferers have this special symptom which originally gave rise to the nomenclature. There are not half a dozen men now living who happen to have had the experience of rabies in animals, and hydrophobia in men, which has fallen to the lot of the present writer. As a veterinary surgeon he has had to do with more rabid dogs than any of the younger practitioners, and as a medical man, with patients under the late M. Pasteur's treatment in Paris. The sixteen Russians bitten by mad wolves were under treatment by that eminent Frenchman when the writer had the privilege of studying under him. If this book served no other purpose than to disabuse the public of misconceptions in connection with this truly awful disease, it would not be written in vain. First then, let us deal with these popular errors. Rabies is not caused by heat or cold, want of water, or food, ill-treatment, or indulgence, or by anything else but the specific poison of an animal already mad, or infected with the virus. The Dog Star has nothing to do with it. All stars are dog stars, to dogs who can see them or benefit by their light. The only heavenly body the dog objects to is the moon. "I'd rather be a dog and bay the moon than such a Roman" is a quotation we may here employ to show that this canine objection to the moon shining in his kennel was long ago noted. So much for causation. The next popular error is so terrible in its consequences to a bitten person, that every reader is implored to play his part in undoing it. Widespread throughout Europe and America, is the notion that a bitten person will hereafter go mad if the biter does so. This is absolutely untrue, and essentially absurd. If the dog is not rabid at the time of the puncture of the human skin, the wound is merely a punctured wound (see Wounds, at page 294). The crowning folly is reached when, for the supposed protection of the injured individual, the suspected dog is destroyed. At all costs he should be kept alive, because he will certainly die within ten days if he is rabid, and if he does not die in that period, the bitten person may rest absolutely assured that he is safe from hydrophobia. Superstitions of less consequence hang around the subject of rabies in animals and hydrophobia in man.

Symptoms.—Nothing can be more important than the early recognition of these. All the domesticated animals are liable to rabies if bitten, but we do not expect exactly the same behavior from a horse, or bullock, a sheep, or pig, as we do from a dog with his higher organization, and closer relationship to us in our homes and our occupations. The bitten animal may develop signs of the disease in a few days, or months may elapse; some extraordinary long periods of incubation in man serve only to emphasize the importance of relieving the person from the agony of mind which follows, by ascertaining the state of health of any animal that has inflicted a bite. In dogs, a distinction has been made between the furious and the dumb varieties of madness, but they are not well defined. A change in the disposition of the animal is the first thing often noticed. An inclination to hide away under articles of furniture, and a reluctance to come out when called. This passes off temporarily, as the normal instincts of affection assert themselves, and the poor creature wags an apologetic tail, as if grieved at his want of cordiality; but the cloud upon his mind once more settles down, and he slinks into a corner again under an overmastering grief which he can tell to nobody. Curiously enough the very reverse behavior will sometimes be seen in a dog of ordinarily surly temper who will be quite demonstrative. He is the most dangerous, because the mood suddenly changes and he is liable to "bite the hand that feeds him." It is snap and go; he doesn't savagely attack and persevere with a fight with man or beast; no rabid dog does, but passes on to the next real or imaginary offender. He may snap at unseen objects, as dogs do at flies, or at a table leg that happens to be in his way. A restlessness sets in that compels him to wander, but the inclination to come home returns at night, and he slinks in unobserved and unwilling to meet anyone. On these jaunts he does not seek and attack men or beasts, but takes a line of country and resents any animate or inanimate thing which impedes his course, snapping at them and passing on. Many sheep in a flock will be bitten, but this is not due to the instinct that makes some town-bred dogs set about worrying as many sheep as they can, for pure deviltry or amusement; it is for the reason that sheep scatter when attacked, and it seems to the disordered imagination of the dog, that they are conspiring to block his way, hence he snaps at one after another until he can pursue his intended course. He is consumed with thirst he cannot slake (quite a different thing from the popular notion of dread of water), and plunges his head into ponds and puddles, but cannot lap, on account of the swelling of his tongue, and stricture of the muscles of deglutition. Failing strength and final paralysis bring him to anchor, and he dies worn out with mental and bodily anguish between the fifth and eighth day from the commencement of the attack.

Dumb Rabies.—Some of the symptoms omitted from the foregoing list will be better placed here, as they are common to both furious and dumb rabies. From the first, there is a difference of expression in the eye. It begins apparently with an intolerance of light, but quickly passes to that indescribable expression which we all recognize in insane persons. There is responding "light of reason" when we address the individual, or the dog; the thoughts are elsewhere, the dog looks absent-minded, although he hears with the outward ear, as absent-minded people do, and if suddenly checked, can repeat the question put to them, although they were not able to answer at the time. There is more than this in the dog's eye; there is a special illumination at the back, which no human eye ever displays, as animals are provided with a *tapetum lucidum*, or luminous carpet, which enables them to see in a low medium of light. This has a greenish phosphorescence, only indistinctly observed at other times. It is still more marked in a rabid cat, as all the felines and night feeders have this feature more developed than other species. (See Eye, Diseases of, at page 379.) The apparently dumb dog fails to bark in the usual way, or utter those sounds with which he usually expresses his emotions of pleasure or pain. The furious dog may "speak," but it is with an abnormal voice; husky and harsh and entirely unnatural, so that his most familiar friends do not recognize it. The swollen and paralytic condition of the tongue and fauces is said to prevent the animal from making any sound, and this mistake has been republished many times. I venture to contradict, from my own exceptional opportunities of observation. I have had a number of cases in my own hospital, which were mute as long as anyone was about but when left alone would throw up their heads and give tongue to the most horrible sounds—

> "It is not a bark: loud, open and free,
> As an honest old watch dog's bark should be;
> It is not a yelp: it is not a growl,
> But something between a whine and a howl."

If a rabid dog is chained up, whether he has contracted the dumb or furious variety, he will pretty certainly chaw up his kennel or anything else within reach, and will swallow stones, and cinders, splinters of wood, and iron, and any solid body he can get down. Some dogs on chain have been known to lick up their own urine in the vain attempt to relieve their burning thirst. Some will continue to eat during the first part of the time, but all try to drink, frequently immersing the muzzle in water, in a way that no dog does when well. The end is always death. Nine or ten days is the outside limit of time from the first observed symptoms, until death releases them.

Rabid horses show marked excitement; they paw, and stamp, and neigh, and their restlessness often passes on to terror, as of some object which is pictured to their disordered imagination.

As the bite which causes rabies is nearly always on a limb it explains why they bite it. Bitten persons usually have an itching, stinging sensation at the seat of the bite, although it has long since healed, and never troubled them until the virus wakes up to do its work. Horses destroy mangers and stable furniture with their teeth: using them in quite a different manner to that of the ordinary crib-biter, who amuses himself with slow gripping of the object and shows no earnest desire to reduce it to matchwood, as is the case with the rabid animal. A morbid appetite will make a rabid horse break his teeth with stones, and cause him to eat his own dung (the latter "vice" is noted in some subjects of chronic indigestion which are not rabid, but they do not crush hard objects). The timid sheep becomes aggressive, as does the gentle cow, and after the manner of their kind, either butt at, or try to gore animate and inanimate objects. They also gnaw the bitten member, and pull out wool or hair with their teeth, and show more capacity for destroying wooden partitions and mangers than would seem possible when it is remembered that they have no incisor teeth in the upper jaw.

Rabid swine toss their litter in the air, squeal and in other ways display great excitement in the intervals when they are not hiding in their litter. Foaming with rage, represents the condition of a rabid pig, until he succumbs on the second or third day. Cats, when rabid, are perhaps the most dangerous of all animals, on account of their fondness for climbing on the person, and coming in contact with the unclothed neck and face. Cats are not credited with high moral principles when in health; the rabid cat would seem to be inspired by the Evil One. The conduct of the rabid goat is quite remarkable. He seeks a high place, a narrow ledge of rock or such like and there bids defiance to the world. Like all other rabid animals he dies in a few days.

Tuberculosis and Tuberculin Testing.—Since the hand of Dr. Koch was forced by an impetuous monarch, the press of all countries has been filled with the subject of tuberculosis, or consumption, as it is commonly called. The discovery of a specific bacillus, and of tetanin, led to the hope of a cure in mankind. That hope was dashed. Indirectly, however, it led to good things, and new treatment, which are not our present concern. What we have to do with it as veterinarians, is to employ the culture as a test, for the presence of latent tuberculosis. The method of preparation is described on another page. As the result of various Commissions which have sat and inquired—and inquired without sitting—we may say that the disease is caused by a specific bacillus, with certain morphological characters, and that man and all the domesticated animals, including fowls, are liable to it, and can be infected with it by inoculation. The degree of susceptibility varies in different species. Since the British Commission proved up to the hilt, that calves sucking cows without udder lesions or outward clinical signs of tuberculosis could become infected, all doubt may be set at rest as to transmission of the disease by the alimentary tract, but the question of heredity is not so completely solved. All of us who have reached mature years, can recall to mind families of men and of cattle, in which the disease seemed certainly to be inherited, as much as the lily and rose complexions of the young folks who succumbed to this dreadful malady. The experts, however, insist that it is not hereditary but must be caused by entrance from the outside of the malignant organism, the tubercle bacillus. They explain away our experiences of particular families in which successive victims have been claimed by the disease, by saying that a special susceptibility or predisposition may exist; a weaker resistance offered to germs, which fall like the rain upon the just and the unjust, upon the resistant and the non-resistant, and point to the comparative immunity some people enjoy with regard to other infectious diseases. It may be so, but there is much yet to be learned, and some of us are old enough to remember when the principle of heredity was a medical fetish, which it would have been profane to question. Another generation, building on our foundations, will dismiss us as a cocksure lot, who had but touched the fringe of science, and saw things "through a glass darkly."

The definition accepted by experts is, that tuberculosis is a specific disease, caused by the bacillus of tubercle which develops irritation, either directly or by formation of toxines, or in both ways. Nodules are produced of one or more descriptions of cells; and exhibit a tendency to necrosis, followed by caseation, occasionally by calcification. The bacillus of one species multiplies in that of others, although certain modifications are observed, more particularly in regard to fowls, the avian bacillus being larger, and with more difficulty transmitted to quadrupeds, but fowls are susceptible to human tubercle, as demonstrated by feeding them on the sputa of phthisical patients. It is important that the farmer should realize the infectivity, as between one sort of stock and another. As an instance, one may point to the time-honored custom of giving any doubtful milk to pigs. If we have a cow with beastlings in her milk (colostrum), and are not able to feed it to the calf as it should be fed, or do not know what excellent custards can be made of it, we just chuck it into the pig bucket. If a quarter is mattery, and some of it has gone into the milk pail, well, we don't send it to market, or consume it ourselves, but into the pig's swill or to his trough it goes. Butchers could have told us long ago, if we have not been in the habit of killing pigs on the farm, that grapes (tubercles) are very, very common in swine. Here of course is an explanation; one of them at least. We must henceforth regard tuberculosis as infectious to all stock, and while seeking to eliminate it from our herds, take the utmost care that we are not infecting children, or foals, calves, pigs, puppies, or cats. Sheep have been omitted from this list, because they are the least susceptible, and except in the lambing pen, milk is not often supplied that doesn't come from the ewe.

Cattle, swine, and poultry come first in degree of susceptibility, then dogs, cats, and horses, and lastly sheep, and goats. The lungs are the most frequent seat of the disease in cattle, horses, dogs, and cats. Horses, pigs, and poultry most often suffer in the liver, spleen, and mesenteric glands. Cattle, pigs, and poultry are liable to tubercular joint troubles (arthritis).

Symptoms.—An ill-thriving or unthrifty condition is common to all seriously affected animals, but other symptoms will depend upon the organs chiefly affected. If tubercles exist in the lungs, or chest cavity, a cough will be a prominent one; if the liver is tubercled there will be excitement or exalted function at first, with copious yellow or biliary evacuations, as often observed in fowls, and later an inefficiency of bile production, followed by fermentation of the ingesta, and diarrhea of a chronic type. A progressive weakness and wasting, or at the best, a failure to respond to good living should arouse the suspicion of the owner. A cough should lead to careful examination of the chest sounds, and the administration of ordinary remedies (see Cough and Sore Throat, at pages 88, 186), and if distinct and lasting benefit is not derived from suitable treatment, one's fears are more or less confirmed. It would be an economical proceeding for all within hail of a competent veterinary doctor, to have the tuberculin test applied early; as one knows what to expect of a re-acter and may medicate with hope, if no reaction takes place. In the case of fowls, we may at once kill a suspect, and make a post-mortem examination, which will probably tell the average layman without any special pathological knowledge.

The great difficulty is with latent or undeveloped tuberculosis, as those men best know who have imported pedigree bulls at great cost, and had them condemned at the port of debarkation, after being submitted to the tuberculin test. Again, many a tuberculous animal comes to the block in good flesh and without suspicion of disease, but is found to have large tubercles in the thoracic cavity; not actually in the lung substance often, but attached to the pleura, or glistening membrane that lines the cavity, and envelops the lung. These tubercles attained to a certain development and then underwent a caseation or cheese-like change, and perhaps a calcification or lime-like condition, and finally became encapsuled with a covering that practically shut them off as closed compartments or foreign bodies, in the same way that a membranous covering forms over a bullet that is not extracted, or fails to come away in matter formed at the time the wound was inflicted. The condemnation of such carcasses at public abattoirs is one of the reasons why butchers do not take kindly to them. Mutual insurance and dividing up the loss, is in some places practised, while most cattlemen seem to think that the state that interferes with the sale of *bona-fide* products for the general welfare, should pay compensation out of the public purse. Whether mutual insurance, public compensation or the elimination of tuberculosis will come before the Greek Kalends, is about even betting. If these apparently healthy subjects had been submitted to the tuberculin test, they would have reacted. But the owner has had no suspicions, or if he had, did not wish them confirmed. The tuberculous cow goes on milking for years, very likely, milking well, and the husky occasional cough that is always to be heard in a cowhouse, is not heeded. When her time comes to be fatted off for the butcher, she doesn't respond to cake, and is probably sold half fat to the cagmag man, who doesn't slaughter at a public abattoir, but dresses the sides in such a way as to remove all traces of tubercles, if they existed only in the organs, and not in the muscles. The expert meat inspector would find evidence, but the best man in the world can only be in one place at a time, and there will always be poor men in the meat trade who will gamble on the chances of not being caught. The reader who has followed what we have here said of self-cured animals or subjects in whom the tubercles have become encapsuled and inert, will be hardly willing to believe that all medical treatment is useless. Perhaps it does tide over a bad period, but is it not far better to test at first and eliminate; joining in a universal crusade against this fell disease of man and beast?

Tuberculin Testing.—Stock owners have expressed their impatience of the veterinary doctor with his squirt gun, and asked why they should not submit their animals to the tuberculin test for their own satisfaction? This they can do in some countries, but the law forbids them in others. It is not wholly due to fear of losing professional fees that vets do not approve of amateur testing. Such nicety is required in the management of hypodermic syringes, to keep them perfectly aseptic or germ free, whilst careful observation of the condition of the animal before and during the test, and recording of temperatures is essential. This is of course well within the capacity of the educated layman of trained observation, and for such as choose to test on their own account, we print here the directions sent out to graduates of the Royal College of Veterinary Surgeons of England, as the Principal of the London College, Sir John MacFadyean, is held to be one of the greatest authorities in the world on the subject of tuberculosis. To obtain reliable tuberculin, one must of course apply to makers of reputation, and also use it fresh, and adopt their dosage. It should of course be understood that tuberculin does not contain the bacilli, else would it cause the disease. It contains the filtered products, which when added to those already existing in a tuberculous animal, cause a rise of temperature. Its preparation is a highly technical matter, but the finished product is sent out in little sealed bottles from which a given quantity is withdrawn by the hypodermic syringe, and injected under the skin, this being first washed and disinfected, perhaps clipped as well, and some part of the neck chosen for the convenience of the operator. Behind the elbow, the loose and comparatively thin skin offers a convenient site for puncture, in an animal with horns, and disposed to use them.

1. While under the tuberculin test, cattle ought to be kept in the house, fed on their usual food, and protected from draughts. They ought not to be allowed to drink large quantities of cold water between the sixth and eighteenth hours after injection. It is well to take their temperature at least once on the day preceding the test.

2. The dose of tuberculin for a medium-sized cow is three cubic centimeters or fifty minims (drops) and it may be varied above or below that, according to the size of the animal. Large bulls ought to receive four centimeters.

3. It ought to be injected under the skin with a clean hypodermic syringe. The most convenient parts are in front of the shoulder, or on the chest wall behind the point of the elbow. The best form of syringe is one with an asbestos piston, as the whole instrument may be sterilized by boiling it in water for five minutes before use.

4. The tuberculin must be injected into the subcutaneous connective tissue, and care must be taken that the whole dose is introduced.

5. Ordinarily the temperature must be taken at the time of injection, and at the ninth, twelfth, fifteenth, and eighteenth hours afterwards. When there is any reason to suppose that the animal may have already been tested with tuberculin during the preceding two or three weeks, it is advisable to take the temperature at the third and sixth hours as well as at the times just mentioned.

6. Animals in which the temperature, during the eighteen hours following the injection, rises gradually from the normal (between 101 deg. and 102 deg.) to 104 deg. or more, may be classed as tuberculous, and in those in which it remains under 103 deg., the case must be considered doubtful, and the animal may be retested after a month.

7. The test is not reliable in the case of animals in the last stage of the disease or in those in which the temperature is over 103 deg. before injection.

8. The tuberculin should be kept in a cool place and protected from light. Should it become turbid or cloudy it must not be used.

9. The tuberculin test does not render the milk in any way injurious.

The above instructions are clear and concise enough, and if followed, will enable one to pretty well ear-mark the sick, the doubtful, and the sound. A great deal of fault has been found with the tuberculin test when practitioners were inexperienced in its application, and some of the laboratory products were a little doubtful. The test has been condemned for not ascertaining the presence of tubercle, and for indicating it when not present, but most of these complaints have been founded in error. A margin for failure must be allowed, but it is a small one, and on the whole tuberculin is so reliable, as to be of the greatest value as a diagnostic agent. In defense of tuberculin, quite a new light has been unexpectedly thrown on some of the supposed failures; a new disease, called after its discoverer, " Johne's disease," has doubtless been in existence for ages, but is new in the sense of its recent recognition. The wasting, which is the one common symptom in the tuberculous beast, is the same in this other disease, but with this difference—the waster, skinter, piner, or whatever you like to call him, does not react to tuberculin. The man then who had such wrecks, and tried tuberculin but did not make a careful post-mortem examination, condemned the test *because it did not show what was not there.* We will pass on then to describe this so-called new disease.

Johne's Disease.—This is a wasting disease often mistaken for consumption (tuberculosis). It may co-exist in a tuberculous animal, but, alone, will give no reaction to the tuberculin test. Wasters from this malady have, until the last few years, been thought to be consumptive, and the failure of the test has been attributed to its inefficiency as a test for quite another disease. Now we know that the absence of any rise of temperature in a waster, when injected with tuberculin, is the best negative test we can get when trying to diagnose Johne's disease. The persistent diarrhea which accompanies this malady, does not enable us to differentiate between it and the intestinal form of tuberculosis, although it is possible that by daily microscopic examination of the feces, miliary tubercle might be found in the one case, and stray bacilli in the other, but this is obviously impossible in the every-day world of cattlemen and is outside the duties of the cattle doctor who must work for a living. The one prominent symptom then, is persistent wasting and diarrhea, and during life we have no means of ascertaining the cause. We must have a dead subject to do this, and can then take measures for the safety of the herd. The seat of trouble is chiefly in the small bowel near the pyloric end of the stomach. In a pronounced case this will be found thickened when held between finger and thumb. The gut should be opened throughout its length with scissors, and the membrane will be found with a dirty brown material mixed with the bowel mucus, and in this, microscopic examination will prove the presence of myriads of bacilli which are the specific cause of the disease. The washed bowel is found to be puckered and the membranous folds will not come undone, as they will when a healthy gut is stretched. In the large bowel, a few blood stains under the membrane will be found, but nowhere an ulcer or breach, as in cattle plague. The insignificant nature of the lesions is a matter of surprise to pathologists, having regard to the very serious illness and its fatal termination.

Treatment merely prolongs the animal's misery and adds to the owner's loss. Removal and destruction of the sick is essential to the preservation of the remainder. Taking all stock off the land for six months, and dressing it heavily with lime and salt, has been found quite effectual, no further cases occurring where this has been done.

Strangles. Febra Pyogenica.—An infectious disease of horses usually occurring in colthood, and having for its chief feature the formation of an abscess between the branches of the lower jaw. The pressure and difficulty of breathing which accompanies this trouble, gave it the name of strangles. A fever associated with the pyogenic organism, or pus formation, is implied by the other name given above. A micro-organism is no doubt the cause, but whether the streptococcus equi is the specific organism or one merely associated with the pus formation is not clear, nor does it matter much to the horseman, whose chief concern is to know that it is infectious, and to take measures to avoid it. Like many infectious infantile diseases, one attack commonly confers immunity against another, but a second dose is possible and has been known to occur. Colts of the first year suffer more than those of the second and third, when the disease most often manifests itself. The more serious and dangerous cases are those in which secondary formations take place in the internal organs, in the groin, and shoulder glands. Horses are not immune from strangles at any age, and those reared in the West and brought into cities at a workable age are apt to take it very badly, and get it still worse on board ship, where the atmosphere is bad despite windsails and windscoops, and all other contrivances in horse ships. A modified form of strangles attacks aged horses in stables, that have had no contact apparently with the young, and from its imperfect development, or interrupted course, has been called bastard strangles. The contagion, it is supposed, is absorbed through the respiratory membranes, and colts that are housed in winter are more disposed to get the disease than those exposed to the rigors of the climate.

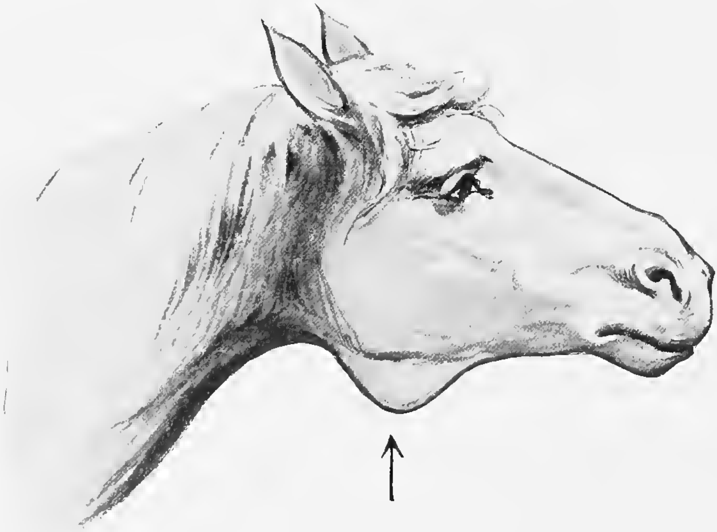


FIG. 6.—STRANGLES.
Abscess Pointing, Ready for Lancet.

Symptoms.—The sick colt is off his feed, his coat stares, and he looks dull and miserable, then signs of sore throat appear, he pokes out his nose in order to breathe as much as possible in a straight line, nods his head, there is a nasal catarrh and defluction of mucus, as in common cold, which presently becomes thicker, and finally pus-like and of a yellowish green color. There is a considerable rise of temperature in the early part of the attack, the thermometer registering 104° or 105° Fahr. The abscess forms about the same time as the pus-like change appears in the nasal discharge, which is very profuse in young horses, and but small, in what has been referred to as the bastard strangles of adults. There should be very little difficulty in the diagnosis of strangles in colthood. It is the time of life when it is expected; the freedom from infection in stable life, and the improbability of any other disease, save common catarrh, from which it is distinguished by the swelling first, and subsequent suppuration of the submaxillary lymphatic glands. It is in regard to adult animals with the bastard form in a more or less chronic condition, that the question arises as to whether it may not be glanders, because the self-made glands are involved in that disease, and there is a discharge from one or both nostrils. Only one nostril may give exit to the matter of strangles in either the infantile or adult variety of the malady, but a little time will usually settle the point, even though the owner is not assisted by professional advice, by microscopic examination of the discharges, or the mallein test. In strangles there will be an increase of temperature which need not be present in glanders of the chronic type. This increase will preclude the use of the mallein test in the one, and favor its employment in the other. In a normal case, running the ordinary course, the swelling under the jaw increases rapidly, is evidently very painful, makes deglutition difficult, and puts the youngster off his feed, if only from the difficulty of mastication and swallowing, when the febrile symptoms have abated and appetite returned. If a rash follows on the skin, the animal begins to thrive sooner, as if he were rid through the surface of morbid material, which the kidneys had failed to carry off. The urine is alkaline during the attack, and this rash is due to vicarious function in which the cutaneous glands become irritated. The pointing of the abscess is the crisis in most cases. (See Abscess, at page 285.)

Treatment.—The disease has to run its course and no attempt should be made to check it. Favoring the formation of matter by poultices and by fomentation, undoubtedly hastens the formation and rupture which releases the pent-up matter, but most of the subjects of strangles are unbroken colts, and cannot be handled sufficiently for such measures to be taken. They may be caught up, and strong ammonia and turpentine liniment applied once or twice. (See Liniments, at page 463.) When the abscess is approaching ripeness and a distinctly soft and bulging point is felt, it will save a day or two of further suffering, if the lancet is boldly plunged into it, and the pus allowed to pour out. Some practitioners prefer to let it rupture naturally, and there is something to be said for the plan, as a better healing takes place than if prematurely lanced, but this we think should depend upon the condition of each individual. If the colt is breathing with great difficulty, standing with legs apart, and looking as if he had had no sleep, it will be better to operate at once, but if the swelling is more forward and not pressing greatly on the throat it may be left to nature. Of the former, some will be in such mortal distress that their lives can only be saved by making an opening in the windpipe to permit breathing through an artificial portal. (See Tracheotomy, also Purpura, at pages 168, 190.) Many colts have been saved by this operation. If there are no secondary formations, and the disease has run its ordinary course, it is astonishing how quickly the patient recovers his health and spirits and picks up in flesh, seeming to be positively benefited by the illness. Washing out the cavity with a disinfectant such as a two per cent. carbolic lotion is helpful, but seldom is interference absolutely necessary. The convalescent will thrive best in the field, if the weather is moderate, but should have corn fed to him daily. Roaring, or respiratory defects of other kinds, seldom follow on strangles, although a simple cold may leave a thoroughbred horse a whistler for life. A recently recovered animal should not be allowed to associate with other horses as it is not known for how long a time the patient remains infectious.

Hog Cholera, Swine Fever, Red Soldier, Blue Sickness, Swine Plague, Measles.—Swine fever goes by a variety of names, as it has many manifestations, and prominent symptoms have given rise to them. Pathologists recognize three infectious forms, and attribute them to as many specific microbes. The variety too well known in America as hog cholera, is the swine fever of England. Swine erysipelas or *mal rouge* is another, and lung and intestinal inflammations of a specific character also occur. It is useless for the pig-master to try to disentangle the conflicting statements of experts, or diagnose the disease with any certainty. Veterinary surgeons themselves cannot decide absolutely, without making cultures and obtaining the specific bacilli. In some countries, Great Britain for example, the appointed veterinary inspectors are not allowed to decide, but have to send the viscera to the Board of Agriculture experts; a practice entailing much delay and dissatisfaction among swine owners. For our present purpose it will be sufficient to point to the importance of immediate segregation of every ailing pig, and thorough disinfection of the premises, while waiting the decision of the State authority. Swine fever has ruined many a small farmer, and the quacks who have befooled them into treating it as something else, have ruined many more. Diagnosis is therefore the question of greatest importance.

Tetanus, Lock-Jaw.—Because there is often a difficulty in using the muscles of the jaw, this disease is universally known as lock-jaw. It is caused by the tetanus bacillus which resides in some soils permanently, and may gain access through a wound, or the most trifling abrasion. It was the difficulty of finding the portal, that for a long time made it seem improbable that infection from without was the only cause of the disease, and such cases as occurred without a wound were called idiopathic, or arising from sun heat or other supposed nerve irritants. Slight abrasions may occur on the membranes of the alimentary or respiratory membranes, as well as about the feet, which cannot be traced, but quite the majority of lock-jaw cases are known to follow on wounds, such as a pricked foot in a horse, or after castration of the calf or lamb. The bacillus enters no doubt while the wound is fresh, but does not show its effects for a few days, as a rule, sometimes a fortnight, but practitioners have come to regard escape over the ninth day as passing out of danger. The malignant organisms do not themselves pass into the animal's system to produce their dire effects. It is their waste material which poisons. (See Tuberculin and Mallein and how they act, at pages 29, 44.) They take up residence in the bottom of a wound and from thence disseminate the virus. The knowledge of this fact is the key to treatment of some cases, but we will first describe the symptoms. The early ones are often unobserved. The writer has seen horses at work with the first signs upon them. A little twitching of the tail to one side, through spasms of the coccygeal muscles while standing in the stable, will be the first thing to attract the notice of the expert. On going up to the animal's head he may find the haw prominent because the eyeball is slightly retracted. The more severe spasms of the muscles of greater power, lead to the so-called lock-jaw which is seldom absolutely immobile: one can put a finger or two into the mouth in the worst cases, and many horses exhibit hunger and try to eat. The spasm generally affects the neck muscles, those of the forearm and haunches, and in severe cases the whole body is thrown into tetanic spasm when touched, or if the patient is startled by a sudden noise. He may fall down in a fit and twitch like a subject of strychnine poisoning, but the spasm is followed by relaxation and he has an interval of relief, but it is only an interval. Death follows from exhaustion. According to the quantity of waste products circulating within him, or in a word the "dose" of poison he has received, will be his chances of recovery. Powerful doses of chloral and of the bromides have been tried, but have very little effect, and interference provokes spasm. The poison of tetanus and of rabies seem almost only those in which nerve sedatives are inert. To be left absolutely undisturbed with a supply of water and food is the advice some practitioners give and we

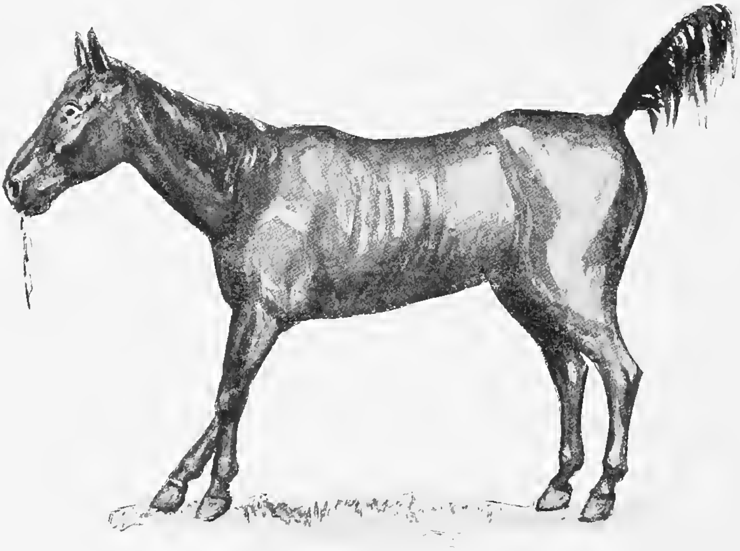


FIG. 7.—TETANUS.

Stiff as if all in one piece—shows white of eye and tail erect—nearing the end.

have seen it succeed. An anti-tetanic serum has been tried, but seems of doubtful utility when the disease is once manifest, but probably it has prophylactic value when a surgical operation is to be performed in a country known to be infected (San Domingo, for instance, where a gelding is worth more than an entire horse). The most hopeful treatment is that of bottoming the wound and destroying the bacilli by powerful germicides, such as perchloride of mercury of one in five hundred strength; chloride of zinc, ten per cent.; or a like strength of carbolic acid. This cuts off the supply of poison and the stricken beast will recover if he has not already absorbed a deadly dose. Pricked feet in shoeing, festered corns, broken knees, and the like afford us the opportunity of thorough irrigation with disinfectants. (See Antiseptics and Disinfectants, at page 410.) The owner doctoring his own stock can afford to adopt heroic measures in tetanus. He may know from what has been said here, that the patient will die in all probability, and that a ten to one chance is worth taking in opening the wound and probing to the bottom and scraping away all granular tissues that have formed, after which he will employ his destroyers. Don't be afraid of making a yawning chasm. If the animal doesn't die of tetanus, the largest of wounds will fill up in a comparatively short time. Bulls and rams are particularly susceptible to tetanus after castration. For some unknown reason bulls more often get lock-jaw when operated upon by the ligature (see Castration, at page 368), and many young lambs are lost, both by cutting and docking, for these wounds offer the greatest facilities to the bacilli to enter. The lamb nearly always lies down after castration, before a sound clot is formed and the soil has been the site of previous operations in other years. The bacillus is permanently resident in it. The lamb's open wounds are his opportunity. Treatment in these cases will be on the lines above indicated, and one should not hesitate to cast the bull, or secure the lamb and wash out the clot that has saved him from bleeding to death at the time, because the vessels will have been sealed in the interval. Unless this is thoroughly done the enemy will not be entirely routed. Enough has been said to impress amateur surgeons with the importance of using antiseptics in all operations. (See also Wounds, at page 294.)

Rheumatism.—That rheumatism is a systematic or constitutional disease there can be no doubt, but the cause or causes are not known. We have not fitted it out with a bacterium of its own, or assigned to it a micrococcus as yet. That may come. To be truly representative it should have as many heads as the hydra, for it takes many forms, even to that of an umbrella under which the puzzled practitioner may take shelter. If rheumatism were chiefly caused by cold and wet, exposure to the weather, lying on the damp ground, etc., as is often asserted, then we should find a large majority of cases occur in animals that winter out. The reverse is the case. The stabled horse more often has rheumatism than his brother in the field. The petted house dog is the greatest martyr to rheumatism. Among wild animals, the carnivora evidently suffer from rheumatism, and many a fine old tiger is brought to bay through this infirmity. The difficulty of giving a definition of rheumatism, makes me turn to the standard works, only to find eminent pathologists hiding in a cloud of words. They don't know: I don't know. I will tell the reader what I do know about rheumatism. With the single exception of the subject called Braxy, or Louping Ill, the writer speaks from first-hand experience, in a practice extending over forty years; but that article is borrowed from the highest authorities, who have made a special study of it. Asking pardon for this digression, I suggest that rheumatism is due to the retention of waste products in the body, and is half-sister to gout. So far as animals are concerned there is much evidence in favor of this view. Pain, stiffness, fever, lameness, are the common signs in the domesticated animals, but dogs suffer from rheumatic fever similar to that of man, with the same disastrous consequences to the heart, by a thickening of its valves with fibrin, deposited upon them. Muscular rheumatism of an evanescent character is most common to horses, and not rare among cattle, very frequent in old dogs and pigs. All are liable to articular rheumatism. It seems to have a special affinity for synovial surfaces, as is the case with another but now better understood malady, called joint-ill, and described in the chapter dealing with the troubles of the new-born. A peculiar feature of rheumatism, is its shifting about from one set of muscles to another: from one joint to another. If the doctor doesn't make the suspected joint sore with a blister or liniment, the owner will tell him next time he calls that he was quite wrong as to the seat of the mischief. This has led to the use of what Cockneys call "languidge" between doctor and client. If a lameness cannot be diagnosed it is put down to rheumatism—somewhere. If the muscles of the loin feel hard, yet sensitive when pressed, and the animal turns with a groan, a pretty good guess may be made; or if a pig or dog stands as rigid as the animals in children's Noah's Arks, with humped back, and walking on his toes when made to move, we may put it down to general rheumatism affecting the locomotory muscles. The articular form is generally attended with swelling, heat, and tenderness of the joint and doesn't feel like a sprain to those accustomed to handle such things. The skin often shines and seems too tight for the inflammatory swelling underneath it. This condition in high-class carriage horses is called by high-class vets in attendance "gout." It seems consistent with their lineage and social status that they should have gout. The rheumatism of dogs (kennel lameness) is associated with wet bellies in fording streams and retrieving game, working in deep cover and lying down thus wet and tired. The rheumatism of the pampered pet is more suggestive of retained body waste, referred to in the beginning of this chapter. Pigs most often suffer in the wet stye while encouraged to eat more than they can digest, and deprived of exercise.

Treatment.—The rheumatic horse, ox, pig, or dog, will almost certainly benefit from a preliminary dose of opening medicine. For the horse and dog, aloes; for the cow, salts, and for the pig too, if its bitter taste can be sufficiently disguised with some favorite condiment. Dogs take very large doses of aloes compared with other animals. (See Table of Doses, at page 431.) The muscles affected should be rubbed with a comparatively mild liniment, in order that it may be repeated often, combined with massage, and avoid scalding the skin. (See Liniments, at page 463.) Joints are best blistered despite their painful condition. Experience endorses the practice of applying a smart blister "to draw out" the rheumatic poison, although science cannot say how it is done. There are plenty of empirical treatments that have received subsequent endorsement with fuller scientific knowledge; blistering and firing, for example. Nobody knew why they did it, but believed it was "a good thing." Internal administration of large doses of salicylate of sodium, or of salicine for the first few days has the effect of bringing down temperature. The sodium salt has the greater advantage of keeping the fibrin of the blood in solution and preventing those deposits upon the valves of the heart previously mentioned. Prior to its discovery, all subjects of rheumatic fever might expect valvular inefficiency to follow. Dogs respond to salicylate of sodium in a very gratifying manner, and when in gouty old pets it fails, colchicum and soda, or potash, may be employed for a change. (See Dose Table, at page 431.)

Lumpy Jaw, Wooden Tongue, Actinomycosis, Big Jaw, Etc.—The disease so generally known by the name of Lumpy Jaw is a source of much loss to cattlemen, and it is not generally known that it is curable. The cause is the entrance into the animal of the ray fungus; a vegetable micro-organism which has a preference for the tongue, face, and bones of the lower jaw. The ray fungus grows upon the awns of cereals and upon the coarser pasture plants when in seed, and, taken in food, may gain access through any slight abrasion of the tongue or membranes of the mouth, and commence to multiply or proliferate. It is the general experience of veterinarians that the head and its glands, in which of course we include the mouth and its contents, are chiefly and almost exclusively invaded in cattle, but the actinomycotic tumors may grow in any other part, as we know to be the case in human subjects; the abdominal organs being a more frequent seat in man and multiplication of the growths a cause of death. Medical practitioners have not been so successful in the treatment of this disease in their patients as veterinarians have been in animals. All the domesticated species are liable to actinomycosis, but their mode of life influences the seat of it to some extent. Sows with long pendulous udders, liable to scratches on rough pasture, make an opening for the ray fungus to enter, and so we find it more frequent in the mammary glands of these animals than elsewhere. It is not always easy to differentiate between a lumpy or big jaw caused by this organism and the more malignant diseases, as carcinoma or cancer, but the subjects of actinomycosis wear the appearance of an accidental enlargement, rather than of a constitutional and serious illness.

There is not the loss of health and pen-feathered, hide-bound, sick look about a beast with a lumpy jaw from the ray fungus that there is in cancer. When the tongue is the seat of mischief, the symptoms are such that he that runs should read, because the animal slavers or slobbers, the mucus strings hang from the corners of the mouth; the food is dropped, half chewed, and the hungry beast tries ineffectually to roll the morsel across the mouth with a tongue that has lost its mobility, and thus acquired the popular name of wooden tongue. When an animal is seen to "quid" or slaver, as has been pointed out in connection with diseases of the digestive system, the teeth, etc., careful examination of the oral cavity should always be made. In wooden tongue there will be found thickening of the organ and consequent shortening, stiffness, little elevations of a gritty character, some of them broken and openly sore. Such a state of the tongue is diagnostic.

Treatment.—If taken in time and boldly treated a cure is almost assured. The ray fungus cannot live in the presence of iodine. We have therefore to get that substance into contact with the sores approachable on the surface, and saturate the blood, as it is called, by solutions of the drug. The term saturation is a convenient but not scientific one. It has been ridiculed by the British Board of Agriculture when applied to the carbolic treatment for abortion, but it means in the present connection the introduction of such an amount of iodine as the beast's system will tolerate. Such saturation we know from experience makes the patient uninhabitable to actinomyces. Medical readers need not quarrel with the term, as they will have combated syphilis probably by the continued use of mercury in those modern combinations, which permit of saturation, without inducing the salivation so much dreaded by their predecessors. As a dressing for daily application to the tongue or other raw surface, a mixture of equal parts of tincture of iodine, iodoform, and pure carbolic acid, has been found most effectual. For internal use, iodide of potassium has been best employed in doses commencing with half an ounce daily, and increased to ten or twelve drams during the second or third week. This of course means for an adult beast; smaller doses answering the purpose for yearlings (see Dose Table, at page 431). If the drug is pushed too far there may be an eruption upon the thighs or other nude parts; iodism as it is called, but this is a trifling matter, and the remission of the dose for a day or two is the remedy. The writer's experience of amateur failures is that they have held their hands from fear of the cost; not that they have ever given too much of the drug. It is to be regretted that iodide of potassium is so costly, but one had better spend five or ten dollars on a cow than lose her. This disease is very prevalent in certain districts of England and Ireland, and a cheaper treatment has been advocated by Mr. Edwards, F.R.C.V.S., of Chester, and by Mr. Wallis Hoare, F.R.C.V.S., of Cork. The mixture they recommend is very inexpensive and consists of ten grains each of biniodide of mercury and iodide of potassium, three times daily. (See Medicines, at page 449.) Very young calves have come under the author's treatment and have quickly yielded to the above methods, as have sows and other animals, but owners somehow do not think of lumpy jaw in connection with very young bovines or swine, and this remark is made to put them on their guard. It need hardly be said that the subjects of lumpy jaw should be given soft, moist food, that they can easily mumble over and swallow; otherwise they waste seriously before treatment can give relief.

CHAPTER II

DISEASES OF THE HEART AND BLOOD-VESSELS

It is known to every one before he leaves school that the heart is the central pump for distributing the blood throughout the animal body by means of vessels called arteries, and that it returns in others called veins. Anything then which interferes with its action will affect the general circulation and health, or cause death if the hindrance is only sufficient. Diseases of the heart are due to a variety of causes, some intrinsic, as atrophy of the walls, or congenital defects in the valves, and imperfect closure, but most of the heart troubles in animals are due to specific diseases such as tuberculosis and rheumatism, which cause morbid deposits in or upon it. Animals do not suffer either in heart or kidneys as men do, because they are not torn by the passions of ambition and hatred. Although they all fight for the possession of the female, it is more in the spirit of the prize-fighter, who entertains no real animus, and does not wear his heart out with regret or anger. The old stallion who is knocked out by the young one, simply falls behind and allows the young lord of the harem to take his place. So too with stags, whose swollen necks denote the season of approaching combat. They will ring round the does, and snort defiance to all and sundry, literally "spoiling for a fight," so long as the rutting season lasts, but after that the males consort together without any apparent recollections of animosities stirred by "the eternal feminine." From such things, we may draw the inference that animals do not suffer from some of the forms of heart disease that men do, because there is no lasting envy, hatred, malice, spite, or uncharitableness in their natures. What seems like persistent animosity between individual dogs, is but the result of inconclusive battles, as most observers will agree.

Organic disease of the heart is distinguished from functional. Palpitation may be felt and heard, and even seen in a horse or dog suffering from acute indigestion or suddenly startled from a reverie. This is but functional disturbance, and is evanescent. The wasted heart; that in the cavities or substance of which tubercles are deposited, or the fibers of which have undergone fatty degeneration, is organically diseased, and presents quite a different problem to the doctor.

Inflammation of the Heart, Carditis.—The substance of the organ is to be regarded as a mass of involuntary muscle, but its whole body is never involved in acute inflammation; death would precede such a possibility. Carditis must be understood to mean inflammation of a portion, as when a foreign body lodges in the heart; a swallowed needle, for example, in the dog or cat, a piece of fencing wire in the bullock; a bullet in the war-horse. An active tubercle, or the heart worm (filaria immitis), may give rise to acute inflammation, in which the whole organ sympathizes and its functions become deranged. These cases are seldom accurately diagnosed during life, although a very good guess may be made by those who have seen similar ones. They are almost, but not quite always fatal. If any treatment is attempted, it should be in the way of placing the patient under restful circumstances, giving a sedative, as chloral, or bromide, and when the acute stage is passing, such known heart tonics and stimulants as strophanthus and digitalis; but in all troubles of the kind, the bowels should be appealed to by a suitable laxative, and the animal should have but small quantities of easily digested food. Lesions have been found in animals which have enjoyed a fair measure of health after heart attacks, which have quite clearly proved the possibility of recovery or accommodation, so that in the case of animals not destined for food, it is worth while to doctor them, however desperate the case may appear.

Hypertrophy or Enlargement of the Heart, Dilated, Etc.—This disease, so common to athletes who have been badly trained, that is to say, too quickly called upon for great effort, without that slow and steady development which will be referred to in the chapter on Conditioning, is chiefly found in the race-horse, the hunter, and the dog. A truly hypertrophied heart is one in which the walls are increased in thickness, and should be distinguished from that which is merely dilated. The power of the walls is increased in the first; it is diminished in the latter. In the hypertrophied one, there will be no more blood to pump, but more power to do it, provided always that the enlargement is a healthful thickening of the muscular fibers composing it. The dilated heart has wasted walls, whose contractile force is reduced, while the cavities contain a larger amount of fluid to be propelled. It is a weak heart and may serve a cow or a lap-dog, but will not do for a hunter or chaser. The heart with thickened walls is more likely to undergo fatty degeneration of its fibers, and then it will fail. This is what commonly happens to the champion runner, when he retires to run a saloon instead of a race, and as he drinks to the health of his admiring customers he does so to the destruction of his own. Besides over-exertion of the heart from bodily excess, there are other and involuntary causes, as when an obstruction exists in a great vessel. The heart makes an attempt to pump them through, and is overworked in the same way as if caused in the manner previously mentioned.

The symptoms are not easily made out, and it is necessary to have an intimate acquaintance with the normal heart sounds in order to understand the abnormal ones. The healthy heart gives two sounds which have been described as " lub-dub " or the systole and diastole; one or both of these will be exaggerated or oppressed, according to the contractile power of the organ. In the early stage of carditis (above), and while an hypertrophied heart is undegenerate, they will be increased in force. Later, the contractions will be quicker but feeble, as in most febrile diseases. The writer is not attempting the impossible task of teaching the amateur the correct diagnosis of heart diseases; few professionals attain to much knowledge in this direction; but he is desirous of making its variations in force and number understood in a general way, before passing on to the subject of pulse and temperature; the pulse being of course the distant recorder of what the heart is doing, and of much assistance in the diagnosis and treatment of disease in general. The art of " taking " it is easily acquired.

Inflammation of the Heart Membranes, Pericarditis, Endocarditis, Heart Water, Dropsical Heart.—All the above names are applicable to a condition frequently met with in animals. Pericarditis is inflammation of the investitures of the heart, and endocarditis that of the lining membrane. Both accidental and constitutional causes account for it. Cut ends of fencing wire, nails in corn and cake, and many other hard bodies have been found lodged in the pericardium of bullocks. Swallowed in the first instance, they have passed safely down the narrow gullet and made their way through the stomach and diaphragm, and again and again worked their way through the liver, leaving marks as if it had been punctured by a shot-gun; and finally getting arrested in the tough membranes investing the heart. I have seen many cases, and they have always been at the base of the organ (the top), and during life, one symptom in common was observed, namely, the curious alternately deadly cold legs; one, two, or three legs, with the usual feeling, and one icy cold; not always the same leg. The heart sounds could not be heard, or if faintly discerned would resemble a muffled drum at a great distance. The pulse is oppressed—small, feeble, fluttering, without force or impact, to the inquiring finger pressed upon an artery. The subject varies day by day, sometimes obstinately standing, and taking little interest in food and surroundings, at other times cheering up and making false promise of amendment. In the end one finds the beast dead; more often than not he has fallen dead, and resting upon his breast-bone, looks so natural, that a second glance is needed to assure one's self that he is not sleeping in a normal attitude. Needles and pins bring about a like condition of pericarditis in dogs and cats. Whether a foreign body lodged in the pericardium ever gets released, is not known, but many dogs and cats have had needles (thread and all) come out at remote places like the loin, and the flank, and even the haunches. There is always a lot of fluid in the cavity, that is to say, between the heart and the pericardium; normally, there is a glycerine-like lubricating fluid, which facilitates the heart's movements, but in pericarditis from whatever cause, there is a dropsical fluid or "heart water" as it is called by South Africans when caused by an organism. Inflammation of the heart and its covering and lining membranes, may all exist together as the result of morbid deposits, particularly those of tuberculosis. They are most conspicuous in the pig, and grow in a very short time, as quite young animals are found after death to have cauliflower-like bodies thickly covering the organ and occupying its cavities more or less. In rheumatism and joint-ill a somewhat similar deposit is seen.

Treatment of pericarditis or the lining membrane will be the same as that advised for carditis, or inflammation of the heart itself; indeed it is difficult to distinguish the one from the other during life, and after death they are generally found more or less associated. It is only in text-books that these things are good enough to keep themselves apart, for the benefit of the student and the examiner.

Diseases of the blood-vessels occur in animals, through parasites taking up their residence in them. Asses are specially subject to the formation of nests of the strongylus armatus. Aneurisms also caused by excessive exertion, lead to changes in the structure of the artery walls, which give way and cause fatal hemorrhage. Clots of blood after operations, and accidental injuries, are arrested in blood-vessels, and block the channel. They are called embolisms. Some obscure hind-leg lamenesses are found after death to be due to these pluggings, while partial paralysis, and coldness of the limb in others, lead to a fairly correct diagnosis in life. With a long rest at pasture, there is a disposition to repair, in most vascular diseases and in the case of clots, they undergo fatty degeneration, and are finally absorbed; the removal of the pressure, and hindrance of the blood-stream is followed by restoration of function, as in the human paralytic when hemorrhage takes place in the brain, but is not enough to cause death at the time.

Horses falling dead in the street, or on the race-course, are generally the victims of ruptured blood-vessels in the chest, or heart disease, but no evidence of such a condition has been found, as we cannot use the stethoscope on large animals with anything like the results obtainable from such as we can take in our arms, or control upon a bed; the chest sounds we wish to hear are covered by a foot of tissues in a big horse. The blood-vessels of animals, if we except their extra risk of parasitism, are less liable to disease than man's, and for the reasons given in connection with the heart itself.

CHAPTER III

DISEASES OF THE DIGESTIVE SYSTEM

Converting the crops he grows into living flesh of more value, is one of the chief concerns of the agriculturist. This is accomplished for him by the digestive process in animals. Any interruption of that process, according as it is long or short, small or great, will ultimately determine whether he makes a profit or not. If these things are granted, there is no need to emphasize the importance of facilitating digestion, and removing hindrances which come under the comprehensive term of diseases of the digestive organs, or in a word, indigestion. We will begin then as the animal does, with the prehension, or gathering of food, and trace the troubles connected with digestion from the " ingang " to the " outgang," from whence, in the economy of nature, the refuse returns to the earth to be again utilized in the production of food. Digestion begins in the mouth, and only ends when the last of the intestinal glands have been passed over. The horse takes hold of his food with the lips, the ox twists his tongue round it, the dog seizes it with his teeth, the elephant with his trunk, the monkey with his hands, most birds with their beaks, but the parrot tribe prefer to balance themselves on one leg, and hold food in the other " hand."

Teeth are necessary to all the domesticated animals, and as many of their digestive troubles are due to them, or to their absence, and as we have learned to know the various ages of animals by the number, appearance, and development of their teeth, we may first invite the young beginner to study the unattractive-looking dentition tables which are here set forth. If he will at the same time study the mouth of every available animal, he will find interest and profit in the subject, and can then turn to these tabulated averages for reference, confirmation, or refutation of his opinion as to the age of a particular animal. There are of course variations, but they are so slight as not to materially influence the examiner, if he will bear a few main facts in mind. Learning the ages of animals by their teeth is like other subjects, best done a little at a time, and that thoroughly. A few elementary facts thoroughly grasped will form a foundation upon which to build a more elaborate knowledge, that will eventually confer upon its possessor the power to instantly decide the age of any domesticated animal within certain limits, provided it is normal in development. The few irregular ones create difficulties, and cause disputes and litigation among experts. Taking the horse first, as of greatest value in most countries, we will not stop to examine his mouth while sucking, because the fact of his doing so, his short and often crinkly tail, his undeveloped mane, and general babyish appearance, are enough for any one to know that he is the product of the present season. Custom has long since decided that all horses other than the thoroughbred race-horse shall be deemed to have been born on the first of May. Blood horses are dated from January 1st. May promises a season in which mare and foal may best thrive out of doors. The date for thoroughbreds is put back, in order to race them under rules favorable in handicapping, weight for age, as it is called. Farmers will get their foals dropped as a rule between April and June, and in the course of two or more years the differences in the teeth will not be appreciable, although an autumn foal, and an early spring one, will sometimes puzzle the beginner. The yearling colt will have a complete set of teeth suited to the size of his head, but no one will mistake him for five years old when the second complete set will have displaced them all. The two-year old will be grinding with that same set, which were just a little too big for the yearling, and now, in a well-developed two-year-old look just a trifle too small, and the two central ones which were the first to come will have begun to show wear on their tables. Two-year-olds with good development are sometimes planted on the unwary as five-year-olds, and their full mouth pointed to as proof. Let the reader look at a five-year-old mouth, and he will never make the mistake again; the second set are altogether bigger, and at five, the corner ones will look shelly and unfinished on the inside. At two and a half, three and a half, and four and a half, the incisors come up. With two central incisors too big to match their fellows, the colt is a three-year-old. With two more (one on each side) he is a four-year-old. With no little undersized corner teeth, but imperfectly developed ones at the corner, he is five years old. Remember 2½, 3½, 4½, for breaking through the gums, then reckon the time of year at which you are examining, and the probable date of birth would be between March and midsummer. The subsequent changes can be seen in the illustrations. For the ox, remember the first eruption of permanent incisors will be twenty-seven months, thirty-three months, thirty-nine months, forty-five months or two years and three months, two years and nine months, three years and three months. There are eight teeth in the lower jaw of ruminants, none in the upper. This relates to common crossed or unimproved breeds, but pedigree shorthorns may be put back six months, thus commencing with the first pair at twenty-one months or even earlier, and the others following at intervals of six months. Sheep, one year and three months, two years, two years and nine months, three years and three months. The age of pigs is seldom in dispute except at shows, where exhibitors do not make the mistake of describing them as too old, and the veterinary inspector has to decide. See tables. If the beginner has assimilated the foregoing main points, the rest will follow with observation.

Dentition of the Horse.

Age.	Incisors, Temporary.		Molars, Temporary.		Tusks.	Number.		
Period.	No.	Position.	No.	Position.	No.	Temp.	Perm.	Total.
Birth	4	Central	12	1st, 2nd and 3rd.	—	16	—	16
4 to 6 weeks	4	Lateral	—	—	—	20	—	20
9 months	4	Corner		Permanent Molars.	—	24	—	24
	Permanent Incisors.							
1 year	—	—	—	4th	—	24	4	28
1 year and 9 months	—	—	—	5th	—	24	8	32
2 years and 6 months	4	Central	—	1st and 2nd	—	12	20	32
3 years and 6 months	4	Lateral	—	3rd	—	4	28	32
4 years	—	—	—	6th	4	4	36	40
4 years and 6 months	4	Corner	—	—	—	0	40	40

FORMULA OF TEMPORARY TEETH.

$$\begin{array}{ccccc} \text{M.} & \text{C.} & \text{I.} & \text{C.} & \text{M.} \\ \frac{3}{3} & \frac{0}{0} & \frac{6}{6} & \frac{0}{0} & \frac{3}{3} \end{array} = \frac{12}{12} = 24$$

FORMULA OF PERMANENT TEETH.

$$\begin{array}{ccccc} \text{M.} & \text{C.} & \text{I.} & \text{C.} & \text{M.} \\ \frac{6}{6} & \frac{1}{1} & \frac{6}{6} & \frac{1}{1} & \frac{6}{6} \end{array} = \frac{20}{20} = 40$$

FOOTNOTE TO ILLUSTRATIONS ON PAGE 68.

A.—Side view of skull of horse, showing full dentition.

B.—Colt at 15 months, showing temporary or milk, not deciduous, incisors.

C.—3 years old, showing first pair of incisors. (*a*) the deciduous ones well worn.

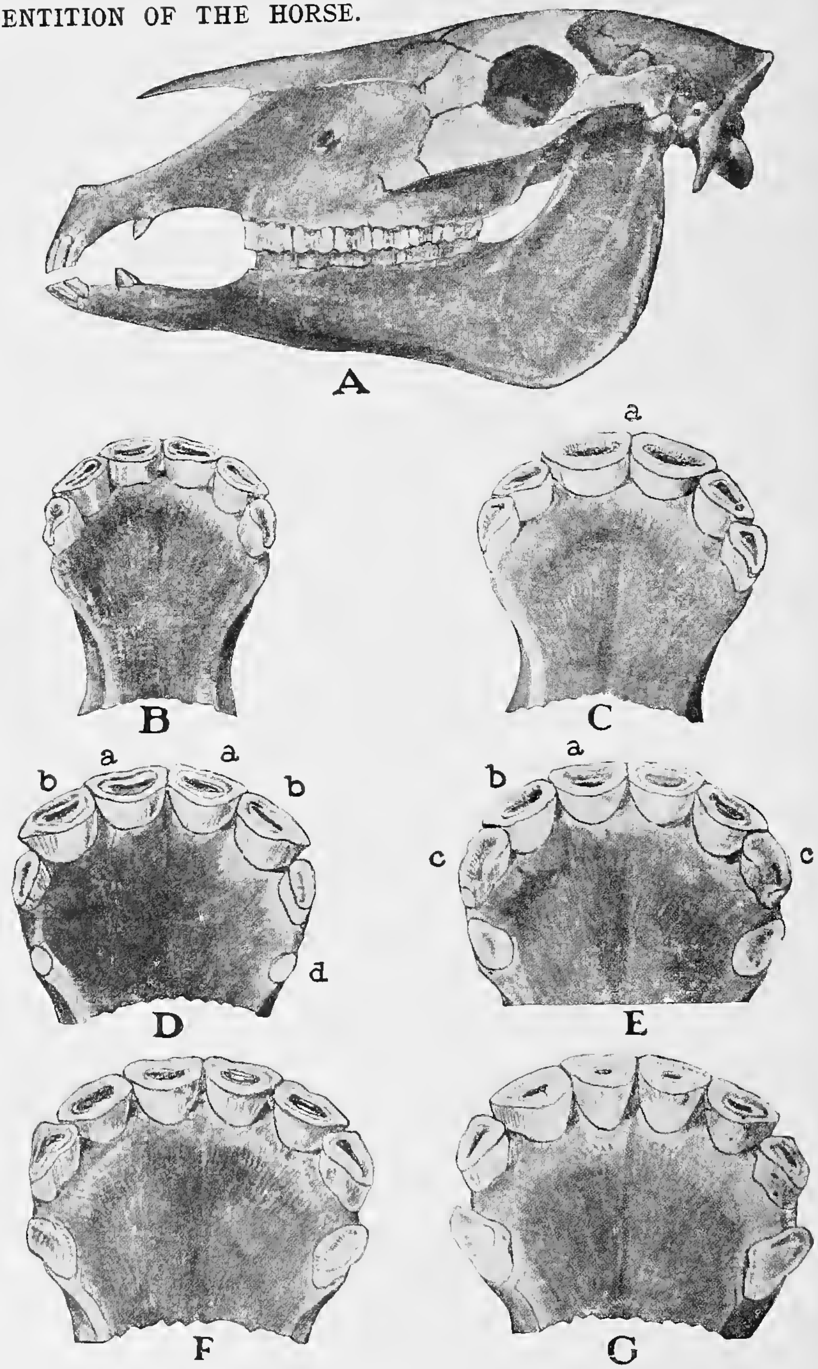
D.—4 years old, showing 2 pairs of permanent incisors. (*aa*) (*bb*) lateral deciduous incisor well worn. Canines (*a*) just coming up.

E.—5 years old. Central incisor broad. not much worn.

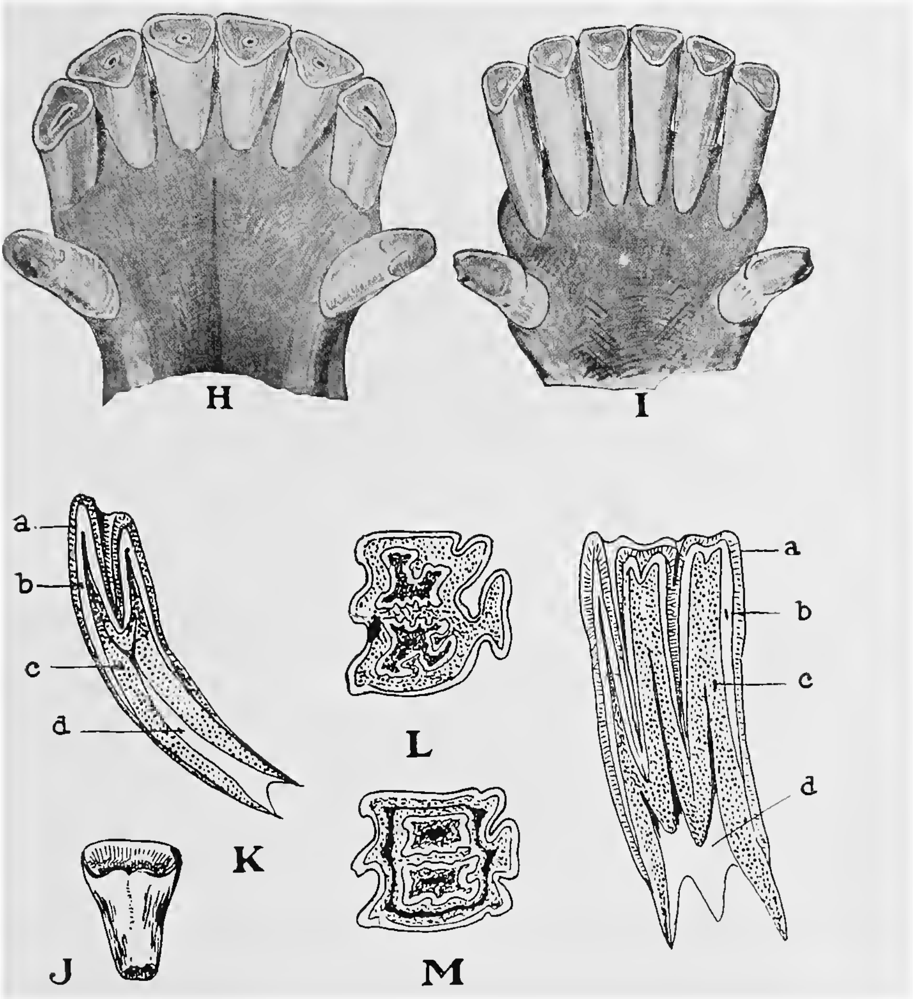
F.—6 years old. Mark in central incisor getting narrower, others showing near; canine well up.

G.—7 years. Mark in central incisor getting very narrow, reducing on median and lateral incisors; canines almost full grown.

DENTITION OF THE HORSE.



DENTITION OF THE HORSE.—*Continued.*



H.—Teeth at about 16 years; mark nearly out in centrals.

I.—Teeth at about 25 years; mark gone; yellow spot only showing; tusk triangular on section, long; canines long.

J.—Temporary incisor of colt viewed from inside.

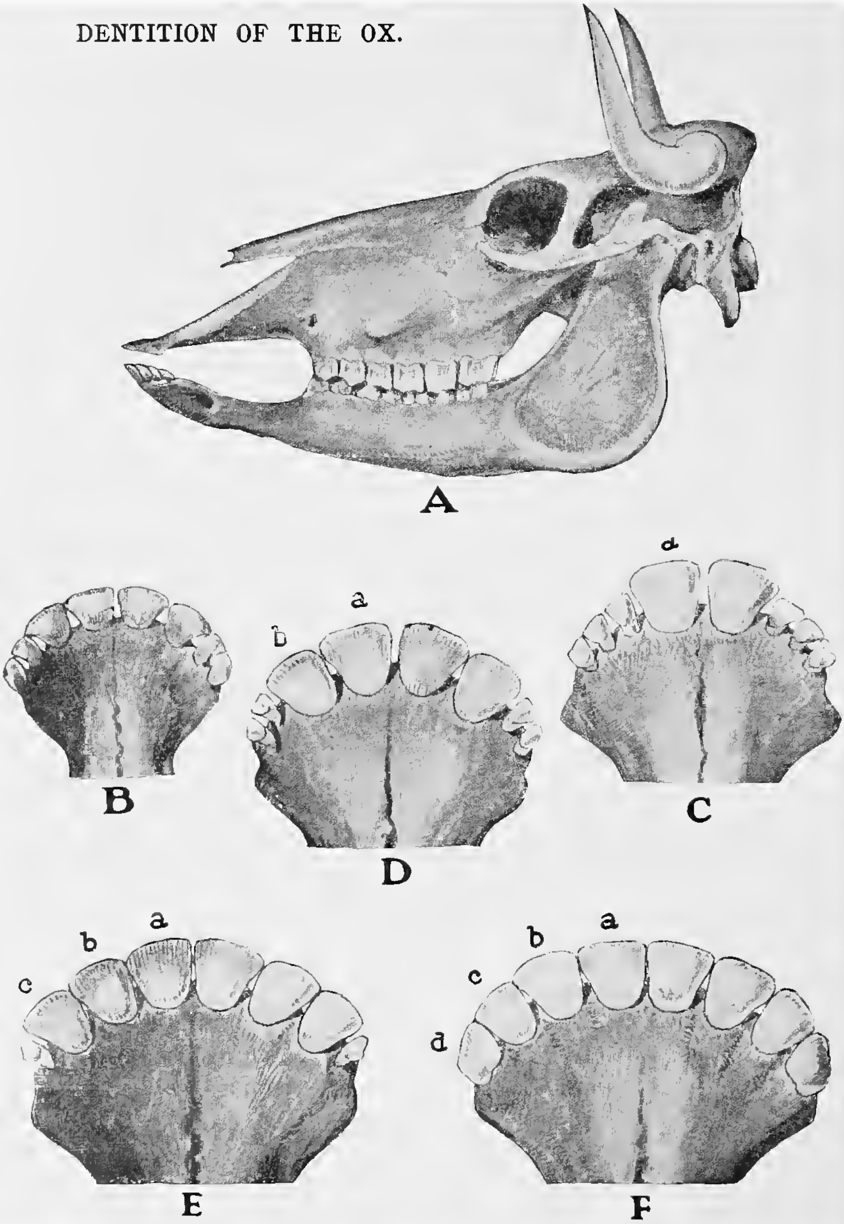
K.—Section of unworn adult incisor.
- *a.* Cement or crustra petrosa.
- *b.* Canal.
- *c.* Dentine.
- *d.* Pulp cavity.

L.—Section of molar immediately below crown.

M.—Section of molar an inch below crown.

N.—Section of molar.

DENTITION OF THE OX.



A.—Skull of ox, showing adult series of teeth.

B.—Calf deciduous incisors.

C.—At two years.

D.—Three years.

E.—Four years.

F.—Full mouth.

Dentition of the Ox.

Age				Incisors, Temporary		Molars, Temporary		Number		
Period				No.	Position	No	Position	Temp.	Perm.	Total.
At birth or soon after				2	Central	—	1st, 2d, and 3d	20	—	20
				2	Central Lateral	—				
				2	Lateral	—				
				2	Corner	12				
Early Period		Late Period					Permanent			
Years	Months	Years	Months			4	4th	20	4	24
1	6	—								
					Permanent	4	5th	20	8	28
1	3	—								
1	9	2	3	2	Central	—	—	—	—	—
2	0	—		—	—	4	6th	18	14	32
2	3	2	9	2	Lateral Central	8	1st and 2d	8	24	32
2	9	3	3	2	Lateral	4	3d	2	30	32
3	3	3	9	2	Corner	—	—	—	32	32

FORMULA OF TEMPORARY TEETH.

$$\overset{\text{M.}}{\frac{3}{3}}\quad \overset{\text{I.}}{\frac{0}{8}}\quad \overset{\text{M.}}{\frac{3}{3}} = \frac{6}{14} = 20$$

FORMULA OF PERMANENT TEETH.

$$\overset{\text{M.}}{\frac{6}{6}}\quad \overset{\text{I.}}{\frac{0}{8}}\quad \overset{\text{M.}}{\frac{6}{6}} = \frac{12}{20} = 32$$

FOOTNOTE TO DENTITION OF SHEEP, PAGE 72.

A.—Side view of skull, hornless breed of sheep, showing full dentition.

B.—Dentition of lamb under 12 months, showing milk or deciduous incisors.

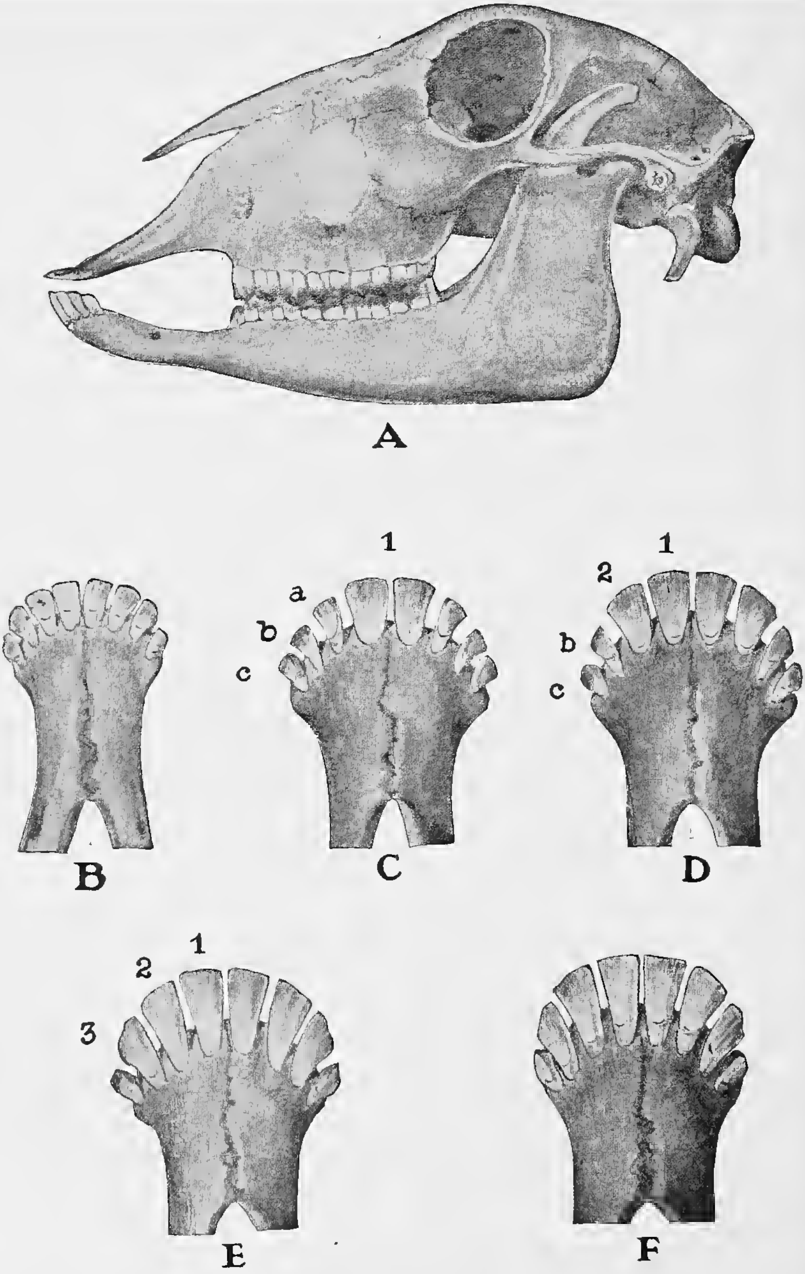
C.—Dentition of lamb at about 15 months.
1. Central pair of permanent incisors.
a. Median deciduous incisor.
b. Lateral deciduous incisor.
c. Corner deciduous incisor.

D.—Dentition of sheep at about 1 year to 18 or 19 months.
1 and 2. Permanent incisors.
b and *c*. Deciduous incisors.

E.—Dentition of sheep at about 2 years and 5 to 7 months.
1, 2, 3. Permanent incisors.
c. Corner deciduous incisor.

F.—Dentition of sheep. Full dentition.

DENTITION OF THE SHEEP.



Dentition of the Sheep.

Temporary Incisors	Age when cut	Temporary Molars	Age when cut
Central Intermediate	At or soon after birth	1st, 2nd and 3rd	At birth, or a few weeks after
Lateral Corner	3—4 weeks		

Permanent Incisors	Age when cut	Permanent Molars	Age when cut
Central	1 year 3 months	4th	—6 months
Intermediates	2 years	5th	9—12 months
Lateral	2 years 9 months	6th	1 year 6 months
Corner	3 years 3 months	1st and 2nd	2 years
		3rd	2 years 3 — 6 months

Dentition of the Pig.

Temporary Incisors	Age when cut	Temporary Molars	Age when cut
Corner	At birth	1st, 2nd and 3rd	4—6 weeks after birth
Central	1—2 months		
Lateral	3 months		

Permanent Incisors	Age when cut	Permanent Molars	Age when cut
Corner	9—12 months	Premolars	6 months (irregular)
Central	12—15 months	4th Molar	6 months
Lateral	18—20 months	5th Molar	10—12 months
		1st, 2nd and 3rd	12—15 months
		6th	18 months

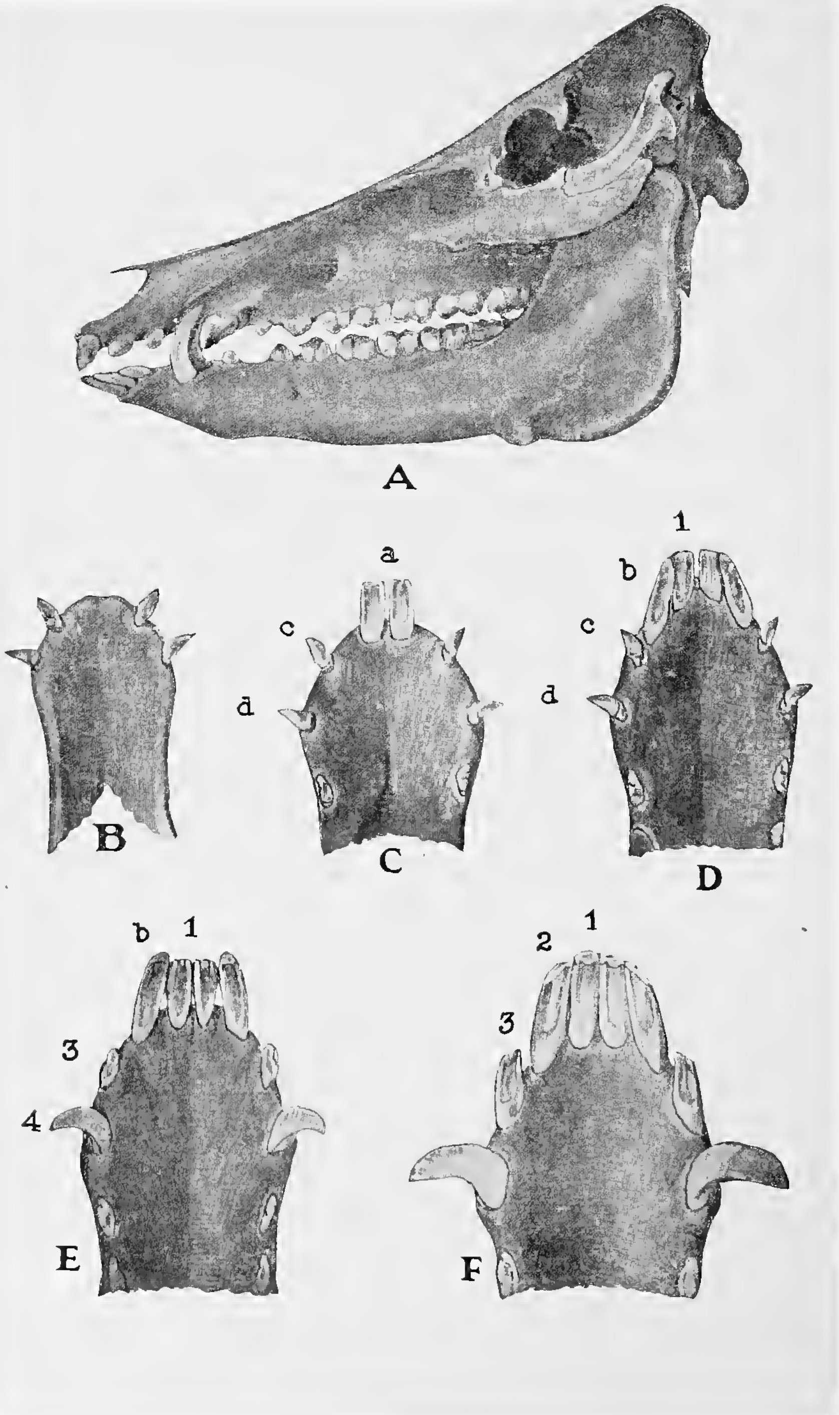
	No. of Temporary Teeth	No. of Permanent Teeth
Horse	4	40
Ox	20	32
Sheep	20	32
Pig	28	44

FOOTNOTE TO DENTITION OF PIG, PAGE 74.

A.—Side view of fully adult pig (sow).
B.—Dentition of pig at birth.
C.—Dentition of pig at 1 month.
  a. The two central deciduous incisors.
D.—Dentition of pig at 1 to 3 months.
  d. Central deciduous incisor.
  b. Medial deciduous incisor.
  Present at birth:
    c. Lateral deciduous incisor.
    d. Deciduous tusk.
E.—Dentition of pig at about 14 months.
  1. Central permanent incisor.
  b. Median deciduous incisor.
  3. Lateral permanent incisor.
  4. Permanent tusk.

F.—Adult permanent dentition.
  1, 2, 3, 4. All permanent teeth. Central and medial incisors showing wear.

DENTITION OF THE PIG.



Diseases and Irregularities of the Teeth.—We have seen by the dentition tables the great advantages which accrue from observation of the teeth of animals, enabling us to ascertain their ages up to a certain period. We have further to remember that upon their soundness and healthful exercise the welfare of the animal largely depends, very largely, as we shall realize if we give much study to the subject of digestion. Physiology is now generally taught in our schools and we must assume a general knowledge of the subject on the part of readers, and will only here recall to their minds the important part played in digestion by the mouth. The domesticated animals do not all take hold of their food in the same way, and here, literally at the threshold of digestion, may meet with hindrances to that essential function. The ox with wooden tongue (Actinomycosis, page 56), will be unable to twist the organ round the herbage and break it off against the dental pad which in the upper jaw serves for incisor teeth. The horse with inflamed lips will fail to grasp his food with those normally mobile appliances. (See Sore Lips, at page 79.) The dog and all the hunting animals which seize their prey with the teeth, will starve if dependent on their own exertions when once their means of prehension of food are taken away. The toothless lion and the battered old canine warrior have been the subjects of fable and a sport for the younger members of their tribes since history began. The lordly elephant is dependent on his trunk to gather the vast quantities of food he needs. The carnivorous animals do not masticate and insalivate their food to the same extent as the herbivorous, and are provided with a double proportion of acid in the stomach, to deal with the flesh which they hastily swallow, but it will be observed that the biscuit eating dog does much more grinding if given his food dry; the same biscuits previously soaked will pass through him imperfectly digested. Wet biscuits cause the bowels to be lax, dry biscuits to be firm. Wet bran (bran mash) acts as a laxative to a horse, dry bran can be continuously fed to him with profit; it does not relax him. The reason is the same in both cases. The wet biscuit and wet bran are not insalivated but act as a mechanical irritant: the dry substances necessitate saturation with saliva before it is possible to swallow them. During this grinding and saturation, the salts contained in the salivary secretion, or spittle, impregnate the food with a valuable ferment known as ptyalin. These acting together commence the process of digestion.

If they are not employed, the work is thrown upon the stomach and the alkaline fluids of the first portion of the small intestine (duodenum), to its detriment, often inducing a catarrh of its membrane, which presently blocks the bile duct and is one of the causes of jaundice. (See Jaundice, at page 122.)

Irregularities of the Teeth.—The development of the primary teeth and their subsequent replacement by the permanent ones are a cause of more or less trouble. They may be too many, or too few, or come up in abnormal positions. A colt has been known to have had as many as ten incisor teeth where he should have had six, and one with but two teeth has been recorded. When teeth are too numerous, they crowd one another into an irregular line, as is the case with children, and if we do not adopt all the elegant contrivances of the modern dentist to induce them to fall into line, we can do this generally. While writing this chapter, the case of a weanyer foal has been brought to my notice, in which there were no molar or grinding teeth whatever. He did well on the teat, but has now to suck up food like a pig, as he cannot grind it. Seven, instead of six molar teeth, is one of the more common irregularities met with in horses. An extra tooth sometimes comes up in the middle of the palate and hinders the cross movements of the tongue. Enough has been said to point to the desirability of watching the development of the teeth in the young. It is too often assumed that only oldsters are liable to be troubled with bad teeth. Extraction is a necessity in the last named case, and a judicious thinning in a crowded mouth will well repay the trouble, as it is found that they soon fall into line when there is room enough.

The commonest defect in molar teeth is a disparity of length. The first and last molar teeth are not entirely opposed, and for want of attrition over the whole table there is no wear on certain overlapping portions. This is well shown in figures on pp. 72, 74.

The tooth shears and the rasp are quite capable of rectifying this trouble in the hands of an intelligent person. The beak-like projections will not have been allowed to assume large proportions by the observant student we have in our mind; the man who is asked to watch his animals' mouths and all that passes into them, and what is left at the other end of the alimentary canal, for he it is who best knows how to deal with animals in health and disease. Tooth troubles are often diagnosed at the other end of the animal, but he who from false delicacy has not made himself intimately acquainted with the excreta of animals, will fail to sec what is quite obvious to a more observant person, in the imperfectly masticated food, the whole corn, and other signs of indigestion originating in bad teeth.

Marginal irregularities are common to aged horses, and should be looked for at six or seven years old, when the rasp will do all that is needed. It is the outer edge of the upper molars, and the inner edge of the lower row that acquire rough edges and wound the cheek or tongue and curtail the lateral movements of the jaw in order to avoid the discomfort. If the tables of a four or five-year-old are examined they will be found to be level, but as time goes on they take the direction of inclined planes. Most horses acquire a habit of grinding from right to left, and this would account for the inclination above alluded to, as well as the absence of wear at the edges. The lateral movements may be interfered with in youth, through the retention of the cast crown of a temporary tooth getting caught between the permanent ones on either side. This obstruction above the level, makes grinding impossible. It is not very firmly held as a rule, and a pair of pliers will be all that is required to extract it. The surface of the molar teeth of aged horses is an undulating one; the wear being unequal and the end ones showing much above the rest. The teeth of the lower jaw are smaller than those of the upper, and they take more wear. A great deal of unnecessary fuss is made when a horse's teeth have to be rasped. He has no need of twitch and gag, and in most cases it will be sufficient to hold the tongue with the tip upturned. The patient should not be startled by rudely pushing the rasp far back into his mouth at first. It should be introduced gently, and the subject of operation allowed to tongue it and ascertain that it is not really going to hurt him. Rasping horses' teeth is tiring work, but I would rather do three without gag or twitch, than two with such appliances. (See Methods of Restraint, at page 413.)

Fractured Teeth, Broken or Split Teeth.—Horses and mules are liable to break off their front teeth when falling on the mouth. Other forms of external violence are responsible for this accident, too. They either break across or obliquely; seldom into the fang. Molar teeth split downwards into the socket when a stone or piece of iron is bitten upon. The lateral fracture may be disregarded but the vertical one may lead to toothache by reason of the salivary fluid penetrating into the alveolus and setting up septic inflammation. Such teeth should be extracted. In seeking the offender, one is guided by the yellowish-black color of the dead or dying member.

Decay or Caries of Teeth.—True caries is comparatively rare in animals, even in dogs whose teeth are a frequent source of trouble. In horses and neat stock the trouble is the same as with dogs, it is caused by retention of decayed food between the teeth; the interdental spaces which set up a periodontitis or chronic inflammation of the covering of the fang by extension from the jawbone which was first inflamed. Decay may, however, commence at the crown. Only economic reasons prevail against filling with gold or other material, and this has been done in the case of valuable or much valued horses (not quite the same thing). Extraction is the usual remedy. A dead tooth is often a loose one, but a molar with only a small spot of decay will be found a tough customer to drag out, and almost impossible without special appliances. These are kept by instrument makers of repute who loan them out for the occasion, and by some of the Veterinary Associations whose members have many advantages through combination. The absence of a tooth in one jaw, may result in overgrowth of its corresponding one in the other, and serious injury has been done in this way. More often the space is partly filled by the teeth on either side of the cavity, approximating each other as time goes on. It will be remembered, too, that the teeth are not exactly opposite; not *corps à corps.*

Parrot Mouth.—The projection of the upper incisors beyond those of the lower row is a deformity leading to difficulty in grazing, and such horses, although doing very well at a manger, often fall away when turned out. It is a condition beyond remedy, but we may prevent wounding the palate by keeping the lower row rasped down. The condition known as underhung is sometimes seen in horses and is quite common in dogs. The lower jaw protrudes beyond that of the upper. It is a particularly ugly departure from the normal.

Crib biting leads to the wearing down of the edges of the incisors. It seldom leads to any disease of the teeth, but for other reasons should give the buyer pause. (See Vices and Tricks, page 416.)

Wolf-Tooth.—A little three-cornered supernumerary tooth at one or both sides of the molars in front, is known as a wolf-tooth. It is a vestigial remain and suggests to us a time when the horse had more teeth and more toes. This tooth is very easily extracted and should be removed if only to satisfy the superstitions of men who attribute shying and other troubles to its presence. It has nothing to do with moon blindness.

In the case of dogs and pigs suffering from fits it is well to examine the mouth carefully for supernumerary teeth or temporary ones that have been unduly retained. It may be that they are causing some reflex action which influences the patient unfavorably. Their extraction, and the blood-letting and relief of congestion, is to be desired whether or not we can trace fits directly to their influence. Family men reading this will think there is some intimate relation between cutting the teeth and the general well-being of the inmates of the house. It is so also in the stable, the stye, and the kennel.

Sore Lips.—Besides accidents and injuries to the lips, they are liable to eruptions caused by constitutional diseases, as the simple aphtha of lambs, the foot and mouth disease (epizoötic aphtha), stomatitis of the horse, and the formation of tumors, such as those produced by the ray fungus (actinomycosis). The common sores which hinder feeding are chiefly caused by abrasions, as when flocks and herds are moved on sandy soils or dusty roads, or compelled to browse on sharp plants like the sword grass, and hard fescues, gorse, and prickly pear, or consume herbage upon which road grit has settled. Horses and other animals that are manger-fed suffer from splinters and rough metallic surfaces, which provoke vesicles and erosions upon the lips. Inadequate precautions after blistering a limb (see Blistering, at page 365), have caused many injuries to the lips that have been applied to the suffering member. Sores originating in little bladders or vesicles always run into one another in this situation, as the animal invariably rubs them, in his efforts to obtain relief. If particles of food get insinuated into the crevices, they are sometimes reluctant to heal, unless receiving that attention which naturally suggests itself in the careful removal of the offending bodies, and the application of soothing and healing remedies. Warts sometimes come suddenly and in great numbers upon the lips of young stock at grass, more especially upon foals. (See Warts, at page 270.) A protest may be entered here against the foolish practice of some breakers, of putting irritant matters on the angles of the mouth, when a subject proves hard-mouthed and irresponsive to the bit. The result is thickening and diminished sensibility after the first few days. Sore lips have been often traced to the practice of smearing bits with oil of vitriol and sugar, for the promotion of a shining coat in heavy horses.

The inside of the lips may be inflamed by the above means, or by falls or violence of any kind, which forces the lips against the teeth; the "pecking" of hunters for example. In horse-pox and stomatitis (which see), the eruptions may come on both sides of the lips. Abuse of the twitch has resulted in paralysis of the lips.

Treatment.—If we except the dog and cat, we may say that our animal patients assist us, by applying softening and emollient agents to the sore places. We can give them moist warm foods like bran mashes, linseed, boiled roots, and hay tea, and in the case of sheep, we can get them to dress their muzzles with ointments, by placing boards over their troughs, with augur holes made through them and the edges anointed with the medicament. Tar is used in that way to keep off the sheep bot-fly, and any other thick substance can be similarly employed if the food beneath be tempting. Sponging with a simple antiseptic such as boracic acid, ten per cent., and glycerine, ten per cent., in warm water, or with two or three per cent. lotions of carbolic acid, or the remedy so often used for the baby, borax and honey, is recommended. Carbolic preparations should never be used for cats, and with caution for dogs and pigs, but solipeds and ruminants will not be harmed by licking some of it into their mouths. Any indolent sores upon or inside the lips, which do not quickly respond to the treatment above, should be dressed with a saturated solution of burnt alum, or a crystal of alum applied directly to the raw surface. The harsh dry skin or excoriated lips from nasal discharges, should be softened by lanoline ointment, lard, vaseline, or olive oil, as the discomfort is enough to put a sick horse off his fancy for food, especially when too hot a mash or sloppy meal has been offered him.

Inflammation of the Mouth, Stomatitis, Aphtha, Thrush.—An inflamed condition of the membranes of the mouth known as stomatitis, in the horse, and sometimes assuming rather severe proportions, has its analogue in all the domesticated animals; nay, the baby at home has it, under the name of thrush, and it is one of the last as well as first troubles of mankind, the dying old man being a frequent subject. The description or symptoms to be described here, apply generally to all animals. Simple stomatitis is commonly caused by indigestion, a disordered stomach, or feverish stomach, such as we experience before our lips "break out" as we call it. We have seen some very bad cases in animals through the mistakes of dispensers and nurses, when too strong medicines have been administered, or liniments have been given in error. Irritation from prickly plants and from wasps' and other stings, and as with infants, so with other young creatures, from teething difficulties.

Symptoms.—A thick, unpleasant-smelling saliva overflows from the mouth. The membrane looks red and swollen, and feels tender, and there is more or less peeling of the surface epithelium. Loss of appetite, or refusal of food, on account of the discomfort caused by eating, is often a prominent symptom, and with horses and cattle "quidding" or dropping the partly masticated food out of the mouth. Finding temporary comfort from cold water. the sufferer eagerly drinks it, or keeps his muzzle under it, and champs the jaw. While this stomatitis, thrush, or aphtha, follows the digestive tract, and is seen at the other extremity in scalding under the tail, it may from the oral cavity extend to the throat, and give rise to a difficulty in swallowing, and a sympathetic cough.

Treatment.—First an aperient, not too strong but calculated to empty the alimentary canal, and suited to the species of patient. (See Physic, at pp. 363, 364.) After the bowels have responded, a few saline doses, as bicarbonate of potash or soda, sulphate of magnesia or the fluid magnesia (bicarbonate), may be given with small quantities of nux vomica, and gentian, to give tone and stimulus to better digestion. (See Table of Doses, at page 431.) Where the membranes of the mouth seem scalded, and disposed to peel, an electuary of one part extract of belladonna may be mixed with four or five parts of glycerine, and form an anodyne and healing preparation.

Inflammation of the Tongue, Glossitis.—The eruptive trouble referred to already may be participated in by the surface of the tongue, but the substance of it is liable to inflammation, accidental, or sporadic and specific, as mentioned under the title of anthrax (gloss-anthrax), and wooden tongue (actinomycosis). Horses get the tongue inflamed through bad biting, or the improper use of the bit, or the twitch, from splinters and other foreign bodies, from the rough edge of overgrown teeth, from bottles broken in the mouth while giving medicines, or from nails or stones wedged between the teeth. Dogs and cats are liable to get fish bones, needles, and pins under the tongue, and failing to release them by its movements, inflammation is set up. Even when it is severely lacerated the inflammation seldom extends to the whole substance of the organ, or many animals would be suffocated or starved (see Rabies in the Dog, at page 36); indeed, of all injuries, those to the tongue are the most readily repaired by nature, so long as it can be kept in a closed mouth. If it protrudes, the mucus dries upon it, discoloration follows, and an almost putrid condition quickly ensues. Tongue wounds are sometimes "poisoned," as it is said, by the lodgment of decomposing particles of food, and until these are removed no healing can take place. The salivary fluid in all cases escapes from the mouth, but when a septic wound is the cause, its odor is most offensive. The throat and contiguous glands may be infected, and then constitutional disturbance follows, and febrile symptoms.

Treatment.—The suffering member should be tenderly handled, but thoroughly examined. If any removable cause is present, no delay should be permitted in extracting it, and the part should be sponged clean and the sore surface painted with a small soft brush dipped in a solution of alum. For all simple inflammations of the tongue and mouth, for abrasions and ruptured vesicles, alum is almost a specific, and acts best as a solution of the "burnt" or exsiccated variety. Septic wounds in it must be treated with more active substances, as equal parts of pure carbolic acid, tincture of iodine and glycerine, these being employed with care so as not to distribute them about the mouth. The alum preparations need no such precaution. It may be that the inflamed tongue hangs out of the mouth, and appears too much swollen to be contained therein, but every effort should be made to repose it, because the moisture of the cavity and the exclusion of air are so favorable to recovery. Laxative foods, soft, moist, and of the temperature of the body, should be given, and if any constipation exists, a mild aperient dose of medicine. (See Physic, at page 363.) If at any time suffocation threatens, resort must be had to Tracheotomy (see page 168).

Lampas, Congestion of the Palate.—The bars of the palate just behind the upper row of incisors in horses, sometimes become inflamed, look prominent or pendulous, and approach the level of the teeth. Young horses when first put to work and "hard tack," or during the changes of the teeth from temporary to permanent, are liable to this trouble, but it has a very exaggerated importance in the eyes of most stablemen.

Treatment consists in a cooling dose or two of medicine, such as two or three ounces of magnesium sulphate, with an ounce or more of bicarbonate of potash in mash, on two or three successive days. It may be well in some cases to make a few pricks with a clean lancet, to relieve the congestion, but the brutal practice of burning should be condemned as altogether useless.

Inflammation of the Throat, Pharyngitis.—By the throat, we mean the extreme back of the mouth, and top of the gullet, not the larynx or breathing tube. It is generally confined to the membrane only, but by sympathy extends in some cases to the larynx, and then there is cough.

Symptoms.—The subject of sore throat holds his food in a hesitating manner after sufficiently masticating it, and then suddenly gulps it down, throws up his head or jerks it to one side, in a manner that clearly shows that it hurts him to swallow. There are many degrees of sore throat, from a simple irritability and inconvenience in deglutition, to intense pain, swelling, and threatening suffocation. (See Strangles, at page 47, also Tracheotomy, at page 168). Some cases resemble quinsy in the human subject, and matter forms, as in abscess, from other causes. (See Abscess, at page 285.)

Dogs and cats tuck in their chins, as if trying to swallow a bone, and this action is pretty general to all animals. If the reader has seen a choked bullock he will remember how constant and ineffectual efforts are made to gulp down the obstacle. The movements in sore throat are modifications of this kind of action, varying in degree according to the intensity or otherwise of the soreness.

Treatment.—In all inflammations of the tongue, gums, membranes or throat, we proffer soft and moist foods, that shall act as poultices or emollients. For sore throats, we prescribe gargles, although our animal patients do not understand the act of gargling. They nevertheless derive benefit from such remedies, because they object to swallow them, when compelled to receive them to the membranes at the back of the mouth. We have only to hold up their heads then for a time, to get the advantage of topical dressings.

Besides gargles we can employ electuaries, placing the medicament far back upon the tongue, and leaving it to diffuse itself over the sore surfaces. (See Medicines, Methods of Administration, etc.) External remedies act well in throat cases, and we may apply poultices, warm fomentations, hot packs, or liniments: in some cases vesicants or actual blisters. (See Laryngitis, at page 164.)

If poulticing is properly carried out, and the fresh poultice brought to the patient before removing the old, it is perhaps better than any other treatment, but many owners will have to content themselves with rubbing in a handful of mustard made as for the table, and not with boiling water, which lessens its strength, or a liniment of ammonia or turpentine. (See Liniments, pp. 463 and 466, also Electuaries, at page 442.) In all throat cases, there is a disposition to febrile attacks, if any constipation is permitted, and it is important to ascertain the state of the bowels, and give suitable laxatives at first, and repeat them as required. In the case of pet animals, the owner should see for himself that evacuations have occurred, and not accept the statements of the unobservant person whom he may have employed to give his dog a run out. Patients suffering from sore throat should not be shut up in hot rooms with bad air, or stables warmed at the expense of a pure atmosphere, but supplied with adequate clothing and kept in the purest surroundings. The throat is the most susceptible of all organs to a vitiated atmosphere.

Abscess of the Throat.—Whether from septic throat, or specific cause, as strangles, an abscess forms, the symptoms will be those common to sore throat at first, but later a bulging in the channel below the ear under the great parotid gland will generally be discovered. The return of water and of liquid foods by way of the nostrils, which is noted in bad sore throats, is one of the prominent signs of abscess formation in this situation. It should be encouraged to point (see Abscess, at page 285), and when ripe, liberated, and treated otherwise as advised under the title of abscess referred to above. A much longer convalescence must be expected after this complication of sore throat, and tonics and medical comforts should be added to the ordinary diet. (See Tonics, at pages 444, 445.)

Salivation or Ptyalism.—A profuse and persistent discharge of saliva from the mouth in horses, cattle, and sheep, is spoken of as salivation by veterinarians, but the old medical meaning of the term was a condition brought about by repeated dosing with mercury or some other drug which acted on the glands which secrete saliva, and induced a spongy state of the gums, looseness of the teeth, and bone degeneration. The former kind of salivation is quite common among stock, and the mercurial variety occasionally met with through the accidental or miscalculated administration of mercury, but this occurs almost always in dogs, for whom condition powders containing it are prescribed by persons without knowledge of its cumulative effects. A little dog can take a big dose of mercury, as a four or five grain blue pill, but if that pill were divided into a dozen doses and given twice a day, he would probably be salivated. In the diseases of the mouth previously considered, a profuse secretion of saliva, and that of a perverted quality, has been frequently mentioned. It is not a disease in itself, but rather a symptom of many. Treatment of mercurial salivation consists in a milk diet, eggs, and other demulcent foods. (See Foods for the Sick, at page 418.) Fresh air and healthful conditions and small doses of saline medicine, such as magnesium sulphate, and occasional ones of castor oil. No actual chemical antidote can be given, but the system has to be built up again, and restoration of function looked for as a result of returning health. Sponging the gums with antiseptic astringents is comforting to the patient, and promotes healing and tone, besides diminishing the objectionable odor of the breath, which in a house dog may decide his fate.

Inflammation of the Parotid Gland, Parotitis.—Under the ears, and extending down past the angle of the jaw is situated the large gland (one on each side) known as the parotid. From it a duct or conduit opens in the mouth, between the second and third molar teeth. This is the gland involved in the mumps of children. Animals are subject to inflammation of it, and to suppuration, or the formation of matter. It appears to be due to secondary infection, as from strangles or influenza, and probably from septic throats, such as we have referred to in connection with sore throat.

The rupture of the abscess and release of the pent-up fluid gives relief, and is to be desired, rather than a settling down into a chronic condition, which results in a permanent enlargement and induration of the gland. The animal pokes out the head as in strangles (which see at page 47). Roaring is always feared, if parotitis is not quickly subdued. The same treatment is advised as for the abscess of strangles (at page 49). In addition, the animal may be made to inhale warm vapor from a nose-bag, in which scalded bran has been placed and some eucalyptus poured over, care being taken not to use it too hot and injure the muzzle. A belladonna electuary placed on the back of the tongue is calculated to allay some of the irritation. Laxative foods should be given only. (See Sick Foods.)

Open Ducts, Fistula of the Parotid Duct.—The tube which conveys the saliva from the gland to the mouth, passes along the inner surface of the lower jaw before entering the mouth, and as this turns round the bone, it is occasionally injured by external violence, or ulcerated by the irritation of a salivary calculus lodged in it. A breach is caused, and the saliva leaks out upon the skin. If quite severed by a cut, there is difficulty in bringing the ends together as they draw apart. The shrinking of the distal portion occurs quickly, as it is not kept open by the passage of fluid. An established opening or fistula—fistulous parotid—is the usual result. The symptoms need no description. The escaping fluid must attract attention more particularly when the animal is feeding, and the secretion is greatest.

Treatment must be prompt to be successful, hence the importance of the owner taking measures himself to close the breach. No solid food must be allowed for several days, and the animal had better starve altogether for thirty or forty hours, to diminish the secretion as far as possible. This advice is given first, because we have seen men trying to staunch the flow while patients were eating hay. Eggs and milk and other fluid food may be given when necessary, a little later. The wound should be sterilized (see Wounds, at page 294), and then the edges of the skin brought together with a suture needle, and rather stout silk or gut, with a deep and firm hold to ensure them from tearing out. Over all a thick layer of collodion, preferably mixed with ten per cent. of carbolic acid, as kept by the stock-breeder for dressing navels. (See Joint Ill, Navel Ill, etc., at pages 248, 249.) The rapid evaporation of the ether favors contraction of the tissues, and the imposition of a colloid layer as a dam to the outward stream, and fence against the ingress of malignant organisms.

A pad of lint should be placed over all, and repose ensured by strapping the face with the nose-band of a bridle. Another plan of treatment is that of provoking a scab to form, and this is attempted by the application of caustics or the hot iron. It is resorted to in cases that have not received early attention on the lines here advocated, or where such measures have failed. If it is definitely ascertained that reunion of the duct is impossible, there remains nothing but to obliterate the gland, or have a permanent running sore. To do this the operator injects up the duct, by means of a syringe, some tincture of iodine, or a solution of nitrate of silver. Inflammation follows, but with its subsidence, the gland ceases to exercise its function, and gradually wastes away, or takes on a condition which has been described on the page referring to parotitis, when it becomes chronic. An abscess may, however, precede the desired termination. The loss of so large an amount of salivary fluid will for a time retard digestion, which it will be remembered begins in the mouth, and the insalivation of the food will be carried out at a slower rate, or swallowed imperfectly dealt with, but it is an established fact that the loss of a gland is always followed by exalted function on the part of its fellow, and animals to whom this misfortune has happened appear to do as well as the majority.

Salivary Calculi, or Spittle Stones.—Incidentally we have referred to calculi as a cause of injury to the parotid duct. So-called stones or concretions of the salts of saliva are occasionally found in other ducts, as the sublingual. A lot of swelling under the tongue and perhaps protrusion of the organ, calls attention to this condition, and on looking at the frenum or bridle, the orifice of the duct is seen to be inflamed, perhaps bulging with the stone almost, or quite in view. If not seen, the swelling should be felt and it may be possible with a little manipulation to force it out, or crush it, or by a slit in the side but not through the opening, remove it, when the inflammation will subside. Even supposing the operation resulted in a fistulous opening, it would not in this situation be of the least consequence. These calculi consist chiefly of carbonate of lime, with some phosphate, and the mineral constituents are intimately mixed with a small portion of animal matter. Anything which obstructs the flow of saliva provokes their formation (by precipitation of the salts out of solution), as when an oat or oat-hair gets under the tongue and lodges in the little orifice through which the saliva enters the mouth.

Choking.—The lodgment of any solid body in the gullet is generally known as choking. All sorts of substances have given rise to it. It more frequently happens to cattle than to horses or swine. Dogs fed in company are prone to choke through their greediness in trying to swallow unmasticated food, bones especially. The cautious cat gets choked by bones she cannot crush, or that get fixed at the top of the throat. The writer has taken many shoulder-blade bones of rabbits from cats' palates which they just about fit, while the narrow end is in the top of the tube. *Horses, cattle, and sheep,* choke with apples, and roots, mangel, swede, turnip, kohlrabi, parsnip, carrot, and the like, when fed whole to them, or chunked with a sharp grafter instead of being put through a root-cutter or pulping machine. If one hasn't a machine, it is better to feed whole roots, and let cattle chew them up themselves, than to give lumps of doubtful swallowing size. Grooms with notions of their own as to providing gloss on the skin without the expenditure of *oleum ulnaris,*

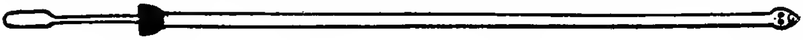


FIG. 8.—PROBANG, OR CHOKE ROPE.

have caused choking in horses, by balling them with whole hen's eggs and onions. Wire, thorns, sticks, and other foreign bodies in the forage, cause choking, but there is usually what lawyers call "contributory negligence" on the part of rash and gluttonous feeders, who, like their masters, do not stay to comminute their food and properly insalivate it at the "quick lunch" bar, but wash it down with a drink, and ask the stomach and intestines to do work that would be better performed in the mouth.

The symptoms depend a good deal upon whether the obstruction is at the top of the gullet, part-way down, or near the stomach end. They are most acute when the lodgment is high up and pressing anywhere near the larynx, and least so when the offending body is near the other end. In a typical case of high or median choking, the animal behaves very much as in sore throat (which see at page 83). His head is carried with stiffness, his nose poked out, and he keeps tucking in his chin in vain efforts to deglutate, and pain is evident to all. Restless movements of the jaw, and copious discharge of frothy and ropy saliva from the mouth is common; any fluid poured down the throat comes back through the nostrils, and generally provokes a cough. In some low chokings, and in the case of lethargic beasts, nothing beyond a failure to eat or drink is noted by the attendant, until the paunch becomes distended by gases. Only in the rarest circumstances do horses or neat cattle vomit, but when choked in the upper or middle portions of the gullet, they make convulsive efforts to eject upwards, as well as to pass the obstruction downwards, by gulping. The pressure upon the windpipe often gives rise to a roaring sound in breathing, and greatly alarms the novice who is more in danger of taking rash measures than of losing his beast by delay. Well-bred horses are terribly frightened, and are often difficult to control and relieve. The neck muscles are thrown into spasm, the chin pressed down towards the breast, and the arching of the crest of course results. The staring and wild eyes become bloodshot, and the anxious expression denotes much fear. This spasm of the neck is communicated later to the muscles of the body also, swelling up of the abdomen continues, and breathing is made more and more difficult, so that the animal eventually dies if not relieved. Treatment should be prompt, but "festina lente" should be the motto. A high choke may be felt from the outside, or evidence of it obtained by the added trouble and cough, resulting from hand pressure upon the throat. It may be got at sometimes by opening the mouth, pulling out the tongue (with the hand dipped in meal to afford grip), and a pair of pliers or a finger judiciously employed. We should try to get the obstruction removed upwards in high chokes, and in many median ones, when we have tried manipulation outside and find the body more disposed to yield in that direction. If it is desirable to experiment in both directions, an object that can be seen bulging in the channel of the neck, and compressed by a hand on either side, can often be persuaded to move on; indeed, the resistance offered is very slight in many cases, although the animal has failed to swallow it. After the first few efforts on his part, the muscular or contractile tube becomes paralyzed, as do all muscles for a time when overextended. (See Castration and tiring of the cremaster muscle, at page 368.) From such temporary paralysis they, however, quickly recover. The musculo-membranous tube we call gullet, or œsophagus, is capable of great dilation to pass large objects, larger than can get through the small intestine, although they have negotiated the stomach, and given the password at the pylorus, where an unseen sentry stands on guard, and refuses all unlikely looking objects, until they have been again and again subjected to the influences of the gastric juices. (See Stoppage, especially in regard to dogs, at page 123.)

If the first cautious efforts to remove the obstruction by manual interference fail, we should pour a little linseed or olive oil into the throat and hold up the head for a moment or two, to enable us to reach the object. Then manipulate again from outside if in reach, then another little dose of oil, and an interval of half an hour in any but a case threatening suffocation. If we cannot move the body, then we may resort to the choke-rope or probang, first oiling it. Proper probangs with cup-like ends are the best, but in their absence we may get a stout new Manilla rope, and whip one end as sailors do, but leave a bulky soft end as sailors do not, because such ends won't reeve or run through a sheave. Gags are best done without. Having secured the horse or beast, sheep, dog, or cat (the latter is the most difficult of all to unchoke), the probang should be cautiously introduced as far as the thick arch or dorsum of the tongue, and once there, rapidly passed through the pharynx, and down to the offending object. Once over the back of the throat the patient, of whatever species, loses his terror of the operation although he doesn't pretend to like it. There is greater art in the subsequent use of the instrument, although all the beginner's fears are experienced in approaching the performance. The novice must not use much force nor employ it intermittently. Having felt the probang's further progress arrested by the obstruction, he should give a nice steady push, and if it moves, not desist until he has landed it in the stomach by one sustained effort; then he may pause, and a little to one side of the animal's head if he is wise, for there will likely enough come up a blast of gas that will extinguish his candle if he is operating at night. It is enough to put one's own " light " out at times. The instrument may then be withdrawn and the patient left in quietude, but denied any food for a few hours, after which, soft, moist provender should be supplied. If the first attempt fails, the probang should be withdrawn, more oil introduced and another attempt made in twenty minutes, or half an hour. Unless the offending body is rough or pointed it will almost certainly yield in time. Time favors the maceration and softening of it, and many cases are self-cured in the patient bullock, who stands and dribbles and waits for perhaps a couple of days.

It will be seen then from what has been said above, that hasty and violent measures are to be deprecated, and the cart-whip should not be used as a probang, and broken off in the gullet, for a more skilful hand to extract when it has done irreparable damage. There are cases due to splinters and foreign bodies—not food stuffs—that cannot be moved up or down. Needles and fish-hooks in dogs and cats may be taken as examples. If they are get-at-able we must cut down on them after washing and sterilizing the surface to be operated upon. Lift them out, bring the edges of the wound together with suitable-sized needle and suturing materials. Secure the animal so that he will not rub the place, and keep him fasting for a couple of days, and then feed only on slops he can easily pass down until he is well. Good recoveries are generally made if these directions are carried out. The rash or clumsy operator who causes a breach in the gullet will have quite a different result from that which follows the surgical wound above advocated for impracticable " chokes." The gases from the stomach, and air sucked in from outside, will get between the skin and connective tissues, and the animal will swell first about the neck and then all over the body and will die.

Vomiting.—If the reader has perused the article on choking, he will have noted the rarity of vomition in equines and ruminants. Only when choked, or suffering from some mortal lesion, as ruptured stomach or diaphragm (midriff), do these animals vomit. It may therefore be regarded as of the most serious import. Pigs and dogs are easily provoked to vomition, and it is doubtful if modern doctors take sufficient advantage of it. Mere engorgement producing uneasiness will cause vomiting in dogs and cats, sometimes in pigs. Dogs seek couch grass, and eat it to make themselves sick. Gluttonous puppies vomit and, like dogs of maturer age, appear to suffer little if any discomfort, or they would not quickly " return like a dog to his vomit." Persistent vomiting is a symptom of gastritis or inflammation of the stomach, in those animals with whom it is easy to cast up the contents of the viscus. (See Inflammation of the Stomach, at page 97.)

Indigestion: Acute—Chronic.—The word indigestion means more than could be conveyed between the covers of this book, if it dealt with nothing else. Good digestion means profit on beasts in the stall, or pigs in the stye, and it means power to the working animal. The young farmer should be urged to careful observation of those evident signs of good or bad digestion which all may learn without books: the facial expression which no writer can describe, the bloom and feel of the coat which he can but name, the behavior which the observant know as indicating the happy temperament that allies itself with digestive vigor if it is not wholly due to it, besides the more obvious signs in the waste products of the body. With regard to the latter there is a natural disinclination to investigation until the importance of the subject is grasped.

The graduates of agricultural colleges have their powers of observation trained, and to them we may appeal to deem no matter too small, and none too distasteful, which enables them to understand nature's operations, and to learn to direct and control them. The stockman should always know whether the evacuations are normal, whether the urine is passed regularly and without discomfort, or if more or less than usual, and what foods influence his charges in these respects. (See Colic, at page 100.)

Acute indigestion in horses leads to great distention of the stomach, and symptoms resembling flatulent colic (which see at page 104), and to rupture of the organ (see Ruptured Stomach, at page 99); but the aspect from which we would view it here is the brain disturbances it gives rise to, and known to horsemen as stomach staggers, sleepy staggers, and mad staggers. They are useful designations, if not classical. The causes may be briefly summed up: over-engorgement on the part of the greedy, persisted in, without acquiring the aldermanic capacity for dealing with excess, which comes to dogs as to men in time, overloading after enforced abstinence, and the necessity of taking great quantities of food because poor in quality. The petted pony of the wealthy lady, the railway trucked horse from the West, and the mountain-bred animal browsing upon gorse, and leaves, and twigs, and woody fibrous food, in order to eke out an existence, are representative cases. But staggers from acute indigestion occur under other and more favorable circumstances. Sunburned pastures, and shortness of water, are conducive to the malady. Want of exercise, or defective biliary secretion, may be the origin of it too. Stodging leads to staggers, as horses are not warned by a sense of repletion soon enough, when their food needs no mastication; neither is it insalivated and impregnated with the ferment ptyalin, which is essential to the first act of perfect digestion.

The symptoms may begin in abdominal pain, pawing and scraping uneasily, or with brain derangement. The sleepy form most often occurs. The animal stands and dreams, as it were, but can be awakened out of his reveries. He soon relapses, when not called to attention. He pushes his head against the wall or manger, and stands in that fixed attitude as if lost to the world. In the field, he moves in a drunken manner, with lowered head, or holds it to one side, or finding a convenient tree or gate, adopts the attitude already described as assumed in the stable. If left to himself he will probably get distended with the gases eliminated, and suffer much pain; the stomach or bowel may be rent, and death follow from peritonitis. In a few cases the fermentation of the ingesta has the effect of setting up purgation, and then a natural cure results.

Without this relief the body swells, the animal throws himself upon the ground in agony, rises again, and repeats the performance, breaks out into patchy sweats, trembles, staggers, and finally falls, to rise no more. It is not known why in some cases somnolence is the chief symptom, and in others, the cerebral excitement called mad staggers; neither is it known why alcoholic poisoning excites the anger of one man, the benevolence of another, and compels to "sleepy staggers" in a third. The horse with mad staggers is not aggressive, but is likely to floor you because he has no focus, or is blind altogether. The fear of man originally felt by all the beasts of the field, and particularly by those brought into subjection and compelled to labor, has forsaken him. He "isn't a nice party to have round," as some one remarked when half a dozen of us were lying under the wreckage of a stable. He is terrified by imaginary objects, and one of the forms it often takes is running back from the manger, and breaking the headstall in trying to escape from something in that erstwhile favored receptacle. There may be efforts to vomit, the expulsion of some sour smelling stuff, and in the intervals of frenzy the body is bedewed with sweat. He finally dies of exhaustion, if not of ruptured organs.

Treatment.—This is another of the diseases that prove the importance of veterinary knowledge on the part of the owner. An early recognition or diagnosis of the disease will almost ensure success in treatment; delay will very likely prove fatal. In the sleepy form there will be no difficulty in administering a bold purgative, a ball of aloes, or a bulky aqueous solution of aloes with salts may be given, but a preference for repeated doses of linseed oil may be shown by the veterinarian when there is much gas to be masked. (See Flatulent Colic and Hoven, at page 104.)

The animal should be encouraged to take plenty of water, but allowed no food whatever. If colicky pains are discovered, repeated doses of essence of ginger, aromatic spirit of ammonia, and chlorodyne in peppermint water, may be given at intervals of two hours. Strong coffee with castor oil answers well, in cases where the aloetic ball does not get to work. The ball is not to be repeated (see

Superpurgation, at page 111), but reliance placed on oil or salines, the latter in great bulk of water.

The action of aperients may be facilitated by unloading the rectum with a greased hand—back-raking, as it is called. The contents of the straight gut may be so hardened as to act as a stopper when the somewhat feeble peristaltic action of the great gut would otherwise be sufficient to propel the waste material along the canal. Icebags applied to the poll, bandages to the legs, and friction with kneading or massage of the abdomen, are all helpful at times.

The writer has found the best immediate results from bleeding. A few quarts of blood from the jugular vein, whether in the sleepy or other form of staggers, at once relieves the brain pressure and the animal has full possession of his senses. In mad staggers the performance of venesection is attended with both difficulty and danger, but it is even more demanded in the circumstances. If the animal can be bled, he will cease to be a menace to the men, or the structure in which he is confined. (See Methods of Control, at page 413, also Anesthesia, at page 389.) If once the bowels respond, there is good hope of recovery, but care in dieting must be exercised (see Sick Foods, Laxative Foods, etc., at page 418), and some digestive aids in the way of soda and calumba and nux vomica may be profitably prescribed. A horse should not be put to work until fully restored.

Chronic Indigestion.—There are certain conformations which do not favor digestion. Horsemen recognize these under the more forcible than elegant terms narrow-gutted, slab-sided, washy, three-cornered, and so on, and their observations are confirmed by a more intimate knowledge of anatomy and physiology. These constitutionally defective animals can never be made much of. They may fill a place in the world, but it is a " soft " place. An hour's display on the boulevard or in the park, and two days pampering between, or light work at a slow pace in the case of draught animals of the utility class. Each individual will have to be studied according to his peculiarities. In other instances, the cause is to be found in the feeding and management—mismanagement would be the more correct term. Hard water, water given after feeding when it should be the reverse, irregular meals, feasts and fasts, too much work, too little, damaged fodder (as mowburned hay), and artificially dried oats, excess of corn or beans, cooked foods, defective teeth, inactive liver, parasites, hasty feeding. These and other disturbances either functional or organic lead to chronic indigestion.

The symptoms are many, but chief among them may be mentioned falling away in flesh and coat, general unthriftiness, dry skin adhering to the ribs (hidebound), uncertain appetite, ravenous at one time and indifferent to food at another, grinding the teeth, licking the stable walls, or sucking the manger, wind sucking.

Constipation is a more frequent concomitant of indigestion than looseness of the bowels is in horses; the reverse may perhaps be said of cattle and pigs, as well as sheep. In some horses, there is an habitual looseness, and the fæcal matter has a most offensive odor. A more or less distended abdomen, with a weak or wasted loin, are often found in the subject of chronic indigestion.

Treatment.—Having named so many causes, the reader will not expect a prescription for a cure-all. The cause must be diligently sought and removed. Then some of the digestive aids previously named, or one of the prescriptions which will be found at page 446, may help greatly to restore vigor, and promote the assimilation of food. We may fail, after diligent search, to put our finger on any special dietetic cause, or to diagnose any special feature in connection with a bad doer, or subject of chronic indigestion, and the reader's attention is invited to study the various liver troubles set out on another page, for this organ is more often at fault in animals in confinement than any other. They are fed on too highly nitrogenous foods, either to enable them to labor, or else to produce flesh or milk, and the liver with its elaborate and complicated functions is the first organ to fail. As a broad, general rule, we may advocate an aperient suited to the species of animal (see Physic, at page 363), for this will clear away accumulations, rouse the liver, gastric, and peptic glands, and those innumerable intestinal glands, which are always pouring out their products into the canal, and contributing towards the complex process of conversion of vegetable matters into living tissues. An interval or rest for the stomach and bowels may be prescribed, and then very light and easily digested food, and a gradual return to harder meats. The stabled horse will often be cured by a return to the fields, and a natural life. Change of diet will be afforded to the tied-up cow. The fatting ox must be first purged and then starved for a day or two, and his ration reduced for a week. He will lose nothing by it at the forthcoming show, as with restored powers of assimilation he will more than make up for the few pounds weight lost while under treatment. The pig and the dog both profit by an emetic and a fast. In many old dogs there is a thick tenacious mucus in the stomach, which hinders digestion and gives rise to a stomach cough. This is best got up, for it can't be got through. Sulphate of zinc, mustard, and other family remedies will answer, but none so well as apomorphine in doses of one-eighth to one-quarter, or even half a grain, in the case of a big dog. It causes four or five vomitions at very short intervals and the desire to drink, after which the rested stomach will deal better with food. In the dog, too, there is frequent liver trouble, and he may have a blue pill of two to five grains, or a dose of aloes of twenty to one hundred grains.

Dogs bear fasting better than any other animals and profit by it. Indigestion is sometimes best treated by alkaline salts with vegetable bitters; the bicarbonates of soda and potash, calumba, gentian, and chiretta, aniseeds, caraways, fennel, fenugreek, ginger, and the like cordial and carminative powders. In other cases the mineral acids are prescribed. Dilute nitro-hydrochloric acid, nitric, sulphuric and muriatic, always much diluted. In liver complications, phosphoric acid does best. Nux vomica is among the digestive tonics and can be given with either acid or alkaline medicines. (The doses of the above drugs for the different species of animals will be found in the Table of Doses at page 431.)

Gastritis, Inflamed Stomach.—The irritation induced by engorgement has been referred to under the title of stomach staggers. Gastritis is something more than disturbance of the functions of the lining membrane. It is inflammation involving its whole thickness, and including the gastric glands. It may and often does extend to the muscular wall itself. All animals are liable to it, but chiefly those with single stomach, as the horse, ass, and mule, the pig, and dog; not to mention poor pussy with a rabbit's paw she can't digest nor bring up.

The accidental administration of strong mineral acids, or the licking of arsenical sheep dips, give rise to gastritis in cattle and sheep, the dip being mixed with saline matters, makes it attractive to animals, and should warn us against leaving unconsumed portions about. Pigs and fowls are often poisoned in this way, and gastritis is shown, according to the species affected. The pig will very likely be violently sick, as will the dog and cat, and the vomits become increasingly serious, streaked with blood and finally gangrenous. Post-mortem examination shows the portion of the stomach nearest the intestine (pylorus) the most inflamed, varying from bright red to purple, greenish black, or disintegrating. In birds, the lower portion of the proventriculus, or portion immediately above the gizzard, shows acute inflammation; the dense and commonly packed gizzard, itself, affords very little evidence, but the small intestine close to it presents the same discoloration and signs of acute inflammation as those referred to in connection with the proventriculus and the bowels of quadrupeds.

Gastritis in ruminants does not lead to vomition, but to pain resembling colic, to constipation or diarrhea, and to those reflex influences upon the brain which have been dealt with under the title of staggers, stomach staggers, mad staggers, etc. (at pages 93 and 94).

Treatment of gastritis will much depend on the cause. If an irritant poison has been taken, the antidote will be looked up. (See Poisons and Antidotes, at page 474.) With horses and dogs accustomed to control, we may apply hot sheets outside, or voluminous poultices. Demulcent foods, milk, eggs, and the like, will be given to sustain the animal, while in fact trying to rest the irritated stomach from ordinary foods. (See Foods for the Sick, at page 418.)

There are medicines known as gastric sedatives, well calculated to allay this inflammation, but their choice will depend on whether the inflammation was caused by, say, a mineral acid, or a caustic alkali. One would not give acid, not even hydrocyanic acid, on top of vitriol poisoning; or soda, to combat sheep dip already containing a caustic alkali. Dilute bicarbonates of potash and soda will go far to neutralize the effects of an acid, and may be used to advantage where the animal's own gastric glands have produced an excess of acid; a common condition in dogs whose attacks of gastritis may be caused by splinters of bone, decomposed fish, or other food leading to acute indigestion. Bismuth is much valued for these cases, but the larger animals require large doses, which are expensive, if a chronic case is under treatment. Carbonated, or so-called soda-water, with a few drops of cognac, is found beneficial to dogs, but the mistake is nearly always made of giving too much spirit in a dose. The writer has seen many dogs drunk, on being called in to them. Most animals would profit by clearing out the alimentary canal, but almost every sort of aperient will provoke vomition, or the symptoms which indicate increased irritation and nausea. The least objectionable is a mixture of castor or linseed oil, whipped with eggs, or diluted with half its bulk of glycerine, or with mucilage of acacia, or gum tragacanth.

Chronic gastritis differs only in degree and duration. There is the same disposition to excess of saliva in horses, and dribbling in other animals. The causes must be diligently sought, and a ration arrived at that will best suit the depraved condition of the stomach. Sometimes the stabled horse will find a cure at grass; cattle will improve sufficiently on linseed cake to be brought to the block: a remark which applies to cows, as they will not produce a profitable amount of milk if they are the subjects of chronic indigestion, or direct irritation of the stomach. Dogs and cats may be kept on milk and slops and derive benefit from calumba, gentian, nux vomica, and other digestive aids (see Dose Table and Medicines, at pages 431, 449).

Chronic dilatation of the stomach results from habitual overfeeding in stabled favorites, and occurs out of doors on moors and on mountain sides where herbage is poor; the above being the same things which induce stomach staggers (which see). Permanent dilatation or stretching prepares the way for final rupture, a not infrequent termination to the life of horses.

Ruptured Stomach.—As stated above, this is a sequel to other pathological conditions, and we do not expect to find it in the young, save for some very exceptional reason, *e. g.*, where bots or other parasites have weakened the walls. Unusual exertion on a full stomach is commonly the antecedent, and the subject is apparently in his usual health.

The symptoms are not always distinguishable from those of rupture of other organs, but in the case of horses, the unusual one of vomition leads us to suspect it, as the most probable of the few lesions which provoke vomiting. It cannot be proved whether vomiting precedes or follows upon a breach in the parietes, some advancing the first view, and others contending that a ruptured stomach would not be capable of the contractions which result in propelling the contents into the mouth. A casual examination of the patient will show that he is desperately sick: " sick unto death." His anxious eye and haggard expression denote a deadly feeling of collapse after the first acute symptoms of colic (see Colic) have passed. The ears and legs feel icy cold, or some of the limbs are cold. The animal stands obstinately, and the respirations are quick and shallow, with a fluttering and feeble pulse, which can with difficulty be felt for some time before the animal dies. The visible membranes, instead of showing deep redness as in ordinary inflammations, are blanched in response to hemorrhage and failing heart. Sighing, trembling, perhaps sweating, precede the swaying and tottering which end in falling, to die with a few struggles on the ground. The temperature at first runs up, but is subnormal before death takes place. No treatment will be of the least avail. The important thing is to recognize the serious nature of the malady, and put the sufferer out of his misery if we are once convinced of the hopelessness of his case.

Colic, Gripes, Fret.—All animals are liable to colic, for by colic we mean abdominal pain referable to the intestines, but it may here be remarked that pains resembling colic are often met with in connection with other diseases, as liver and kidney disturbances, and some affections of the urino-genital organs of both sexes, when they are referred to in this book as " colicky " pain. The owner of live stock will do well to recognize colicky pains, and distinguish between them and genuine colic. If we describe an acute case of the latter, it may help him to differentiate between those expressions of uneasiness and of acute pain which are indices of widely different diseases. We must, however, preliminate, by making the general distinction between spasmodic and flatulent colic. The differences may be well marked, but every experienced practitioner sees the two together. Spasmodic colic, then, is a pinching pain in the intestine due to spasmodic contraction of the muscular fibers which ordinarily give to the gut that gentle undulating vermicular motion, which suffices to carry along the contents over the mucous surface; some of it to pass into the circulation ultimately, and the indigestible portion to accumulate in the last straight section of the gut (rectum), to be expelled at the convenience or inclination of the animal. This spasmodic contraction is provoked by indigestion, by deep draughts of very cold water when exhausted, and by withholding water until an animal has filled the stomach with food which was not properly insalivated. If digestion is not begun in the mouth and continued in the stomach, the intestine may fail in its part, and colic ensue. This applies to both forms of colic, the spasmodic, which we are particularly considering, and the flatulent, to which we will presently refer. To say that constipation, indigestible food, obstructions from dung balls, and intestinal calculi cause colic, is but to repeat what has been included in the one comprehensible term "indigestion." (See Indigestion, at page 92.)

Symptoms of colic are usually sudden and arresting. The most unobservant men must see that something is pretty much wrong with an animal that leaves off feeding, and stamps, and scrapes, and paws back his litter, or behaves in a similar manner in harness or saddle, and is bent upon throwing himself upon the ground if not prevented. He may strike at his belly with a hind foot, look round at his flank, show every expression of pain and anxiety in his countenance, lay back his ears and display anger and fear. When down, he will roll, and groan, and perhaps find a position in the stall where he fixes himself for a time, as man will double himself under similar suffering. This brings us to the disputed point of whether a horse suffering from colic should be allowed to go down and roll, or be compelled to walk about. Some hold the view that twisted gut is more liable to occur while rolling, and so would compel the luckless beast to walk about, and these men also believe that compulsory exercise is likely to assist in expelling fæces and gas, and thus assisting nature to get rid of offending matter. Those of the opposite school say that rolling is as likely to undo a twist incurred by spasm, and not by the attitudes sought, and that if a man finds relief in contortions of the body, so may a beast. The writer's experience is in favor of the latter view. It is a feature of colic to be intermittent. The sufferer will very likely get upon his feet, shake himself, and begin to feed as if nothing had happened; then quite suddenly, with food in his mouth, be pinched again with acute pain, and go through the same performance. This period of remission is important to bear in mind, as it distinguishes colic from ruptured stomach or diaphragm, bowel or other organ, and from enteritis or inflammation of the bowel. In these maladies there is practically no remission of pain, although there will be periods of pause in the manifestation of its acuter signs. The subject of spasmodic colic will appear to be quite well in the interval, and, as stated above, will begin to eat. In the other diseases or accidents mentioned, he will not eat, and will not appear unwell, to those least acquainted with animals. Colic with short or imperfect periods of remission; may be of but a few minutes' or an hour's duration, or may continue over a couple of days, but the longer it lasts, the more likely is it to have a bad ending. The purely spasmodic form, too, is the shorter in duration, while that caused by impaction of any kind will be longer.

We have elsewhere insisted on the importance of carefully noting the excretions of animals both in health and disease, and that not occasionally but daily, for in no other way can one know just how well or ill digestion is being performed. We would say without fear of contradiction that the average hired man, or hand on a farm, does not closely observe these things although he mucks out and carries away the stable litter. The importance of this matter may be enforced by calling the student's attention to the fact, that pain in any portion of the bowel leads to expulsion from the rectum of whatever it may contain in the way of dung balls already there. This may not be the case in colic arising from impaction (of that presently), but simple spasmodic colic, say from drinking icy cold water, will be accompanied by two or three evacuations from the rectum at short intervals, and the whole quantity voided will not amount to one fair unloading such as a healthy horse will expel in a somewhat leisurely manner, with the fullest relaxation of the sphincter. The reason for dwelling on this matter will be apparent, when it is explained that the answer to the doctor's question as to any observed constipation, will invariably be misleading. The man in charge will have seen these two or three expulsions, and say that the patient's bowels are very free. The very opposite condition will be the case in nineteen horses out of twenty. Let not the trained and observant owner or student fall into this common error. Such a mistake leads to the withholding of the purgative which may hold the animal's life within its paper cover. The pulse and temperature in most diseases afford us some information. In colic, not originating from some pre-existing trouble, as impaction, or stone, the temperature is not elevated, or only slightly so, and that during the paroxysms of pain, falling again immediately. The pulse is not much influenced in ordinary cases, nor until continued suffering has depressed it. Then it will be quicker and less forcible. (See Pulse and Temperature.) In enteritis, inflammation of the bowels, or of any of the abdominal organs, or of the peritoneal covering, the thermometer will show early and continuous increase, and none of the remissions of pain we have above emphasized. Before considering flatulent colic, which, as we have said, often accompanies the spasmodic, we will outline the treatment usually adopted and found most successful.

Treatment.—Provide a good bed, and if possible a roomy box. If only the usual stall is available, pack it well at the sides and rear with straw or other suitable stuff, and don't let the animal be left, for fear of getting cast or hopelessly fixed during his struggles. The man who stands by on guard should be provided with a noose or hemp halter, ready to take a turn round a pastern and give the necessary assistance when the patient gets into a bad position. It may take two or three men, one of whom gets a good grip of the tail, but the writer has often pulled a horse out of a bad position alone, by employing his small strength in the right direction.

If the man left in charge cannot do this, he can at least allay the horse's panic when he finds himself stuck. Probably most readers know that a healthy horse will die through no greater trouble than getting cast in the night, and exhausting himself in useless efforts to get up. In most cases it will be good practice to give a ball of aloes varying from four to eight drams according to size and breed. This has been questioned, and various theoretical objections raised, but the general practitioner with most experience has seen many cases apparently saved by early action upon obstructions, no deaths occurring, so far as can be ascertained. A ball will be getting to work (it must be remembered that it takes eighteen hours to show results in a healthy horse) while we are allaying the immediate pain with a choice of remedies, which choice is the greater if we do not fear constipation from them afterwards. We may give repeated doses of chlorodyne (compound tincture of chloroform and morphine), tincture of opium (laudanum), aromatic spirit of ammonia (sal volatile), spirit of nitric ether (sweet spirit of nitre), essence of ginger, compound tincture of cardamoms, tincture of capsicums; or in the absence of any of these medicines we may resort to popular forms of alcohol, as brandy, whiskey, or rum. All of the above, and some of the ground cordial or carminative drugs, are helpful, and we are often in veterinary work compelled to use what we can get, rather than what we would choose. In the chapter on recipes or medicines, the reader will find some approved formula with approximate doses indicated. What is wanted is a rapidly diffusible stimulant, whether it be ether, or camphor, or alcohol, or mustard and pepper, and the like. The first named and the second are accounted the most rapid, and the compound preparations of opium, such as chlorodyne, the best pain killers or anodynes. This may be a good place in which to impress upon the horse keeper the advisability of keeping a gripe draught or two by him, if he would not find himself in the position of the foolish virgins, and unable to borrow or buy in time.

Flatulent Colic.—The distinguishing symptom of this form of colic is the distention of the large bowel with gas. It may follow on spasmodic colic, when the ingesta is retained, or commence in the flatulent form, the gases being disengaged from fermented food with which the viscus has been unable to deal. The contractile movements, alluded to in connection with spasmodic colic, have failed. The distention has paralyzed the muscular coat which cannot pass along the contents. There is a block. The increasing volume of gas distends the abdomen, and the outward appearance of the animal clearly denotes the trouble. It will commence by a filling of that space between the last rib and the hip (antero-superior spinous process of the ilium), which in an average horse is about as big as one's open hand. This should always be tapped in a colicky horse, and if a drum-like response is felt, it indicates flatulence within the bowel, and may decide the doctor on what remedy he will give, if the other symptoms are more nearly like spasmodic colic already described. The causes of this variety of colic, although much the same, are more especially due to retained food of a bulky nature, or imperfectly masticated food owing to bad teeth, or the food itself being unsuitable, or too quickly eaten after long abstinence.

Cooked foods, too many potatoes or roots, miller's offal, engorgement with green foods in the spring, stones, nests of worms, or any structural alteration interfering with the caliber of the gut are responsible for colic.

Symptoms in general, and common to colics, have been named, but the flatulent variety does not come on with sudden violence, but rather with an increasing discomfort and uneasiness which amounts later to acute pain, and is continuous. The remissions or intervals of freedom noted in spasmodic colic are not experienced in the form now under consideration. Again the drum-like body tells its tale, and distinguishes it from enteritis (which see at page 113).

According to the temperament of the animal, its conduct will vary; some show a passionate resentment of pain and throw themselves upon the ground—a real risk of ruptured gut or stomach being then likely—while others of milder disposition will scrape and paw persistently, and seem to be aware that the recumbent posture will be unfavorable because pressing the diaphragm (midriff) forward, and curtailing the chest capacity. The animal, when weary, will go down very cautiously, lie upon the side and look wistfully round at the now immensely bulging flank. The pressure before mentioned against the midriff gives rise to shallow breathing, and a small and quick pulse. Animals on the ground often get relief by prolonged explosions from the anus, the additional pressure of the belly bringing about this desirable result. If the trouble had its origin in eating clover or green meat, an early recovery follows, but if it was caused by the animal breaking loose and gorging with meal, or whole corn, the case may last two or three days, if it does not end fatally.

Treatment.—It is agreed that walking the animal about is conducive to breaking off flatus. The risk of throwing himself down in the case of a horse of irritable temperament, has been mentioned. Everything we can do to let out the wind must be tried. Kneading his belly with the knuckles, two men operating on opposite sides, promotes this, as does back-raking. It may be well here to interrupt ourselves to describe back-raking, for such as have neither seen it done, nor attempted it, as it is a most valuable custom in the treatment of the larger animals, particularly the horse, and in other maladies besides flatulent colic. It should be understood, then, that the sphincter muscle, which keeps the terminal portion of the bowel closed, and opens to pass out waste material, has the same qualities as other muscles and can be made to act by other stimuli than it is accustomed to receive from within. When we wish to unload the rectum, we proceed to grease our fingers and hand generally, hold up the tail, and insinuate first one, then two fingers, with gentle but continuous force, until the rest, and finally the hand and arm, as the sphincter tires and gives way to our efforts. Then we can mechanically remove the contents, returning the hand several times and meeting with but very slight resistance after the first, which in some horses is considerable. This operation is not fancied by novices who have unnecessary fears of being kicked, as well as a natural disgust for a performance so unpleasant, but so desirable for the patient. With the extraction of a few handfuls of dung, the lover of animals will very likely meet with an early reward, he will see that immense relief follows the expulsion of a great volume of gas, and may be encouraged to follow up his work with a clyster of warm water, in which some plain soap has been dissolved, or he may send in some warm olive or linseed oil, or glycerine. If our medication begins at the farther end of the patient we do not stop there, but administer the same class of pain allayers as for spasmodic colic (which see) but in a different vehicle. Instead of diluting the active ingredients with water, we employ oil, linseed oil for preference, because this masks gases; it may be that it dissolves them; anyhow it keeps them from forming (the origin of " salad " oil), and acts as a laxative or gentle aperient carrying on the offending material, or in the case of bowel stones, lubricating the canal, and affording opportunities for removal to a safer place, or possibly to expulsion from the body. (See Recipes, at page 434.) A solution of aloes is sometimes given in these circumstances, but a ball has advantages referred to elsewhere. Spirit of turpentine is given with linseed oil. Ammonia, either as aromatic spirit or as carbonate, tends to break up gases, by forming new and harmless combinations, such as carbonic acid; or antiseptics as chlorinated lime. If ammonia is given it should be in water, and not at the same time as oil, which it saponifies. Flatulent colic is one of those diseases for which the new methods of treatment are specially advisable. The trocar and cannula, so well known in the treatment of hoven or blown condition in cattle, is made in small size for puncture of the gut, to let out the gas. This was formerly thought to be too dangerous and provocative of peritonitis, but experience proves that a sterilized instrument carries no appreciable risks if the skin is also similarly prepared. The hypodermic syringe enables us to send direct into the circulation such remedies as pilocarpine, whose action is very much quicker than that of medicines given by the mouth. (See Hypodermic Injections, at page 457.)

Cattle are less demonstrative when suffering from colic, but they are seen to shift the feet and strike at the belly. The flatulent form is the one usually taken, and the beast is disposed to remain on the ground, stretched out as if dying. The same class of remedies is advised, larger doses of aloes and oil being desirable, and turpentine is one of the best drugs we can employ for them. Bullocks very seldom die of colic, but many horses succumb.

Sheep and other ruminants behave in the same way when griped, and respond to similar treatment.

Constipation.—If the indigestible refuse of the alimentary canal is too dry, or long retained, or evacuated with straining and difficulty, we say that the animal is constipated—the opposite condition to diarrhea.

The causes are numerous. In the new-born it may be plugging of the rectum with meconium or the waste which there accumulates during life *in utero*. (See Troubles of the New-Born, pp. 238-244.)

In the case of horses and ruminants, it can generally be traced to dietetic causes, as too long use in winter of dry provender, want of exercise, insufficient water (if water is very cold many animals will not take sufficient), innutritious woody fiber, such as mountains and moors afford chiefly. Where all conditions are favorable, there may yet be constipation, through failure of the liver to pour its stimulating products into the intestine. This failure of the liver may also provoke the opposite state of diarrhea (which see at page 109).

The symptoms, although familiar, are often overlooked, no sufficient importance being attached to the animal's futile efforts. Arching the back and straining, grunting and seeking a more favorable posture, should always be understood to mean constipation, and need attention. We may almost make an exception to dogs, in whom it is quite normal to make considerable efforts before unloading the rectum. It is only when they fail after exercise and repeated efforts, that we should deem them constipated, because it is their nature to eat bones, and digest the gelatinous portion, while the mineral matters accumulate as a plug in the rectum. Nature has provided a remedy in a number of little anal glands in the substance of the anus, which when pressed upon in the effort to evacuate the bowel, causes them to emit an unctuous material which lubricates the passage of the ordure, after the first portion has been squeezed against the anal ring, then it will be observed that the feces pass out readily. If soft or habitually laxative food is given to dogs these glands fill, but fail to unload themselves; itching ensues, and the dog rubs the anus along the road and often wounds the part, or ruptures one of the little anal abscesses which form as a result of congestion. When a dog cries out in the act of defecation it is because these anal glands are painful. The remedy is not soft food, but restored function by more exercise and the natural pressure already mentioned. Dogs, like other animals subject to constipation, are best treated by judicious dieting, rather than drugs, although these may have to be resorted to, and are of the same kind as will be recommended for other animals.

Constipation in horses is a dangerous condition. It may lead to colic and stoppage, to broken bowel or rupture. Staggers, and many other maladies arise out of, or are aggravated by inaction of the bowels. It should be prevented in stabled animals, by proper feeding. If the dung balls are small in size, or have a glazed appearance, the attendant may be assured that constipation exists, and should take away all hay and dry food, until by bran mashes or linseed he has restored the action. (See Sick Foods, page 418.)

If an early response is not made to laxative foods, medicine should be given: a pint of linseed oil perhaps, or an aloetic ball to a horse. Cattle respond best to large doses of treacle and linseed oil, and to salts given in a great volume of water. (See Physicking, at page 363.) There is a constipation due to inactive liver, which necessitates constant attention and feeding that would make another horse purge. (See Diseases of the Liver, page 120.)

Debilitated and particularly weak old horses suffer from atony or feebleness of the peristaltic movements of the intestine, and then they need tonics as well as soft foods; of these, nux vomica has the best effect, but iron must not be included, as it is disposed to harden the feces. Quinine and nux vomica make an excellent combination for this disease. Constipation is often a trouble of the brood mare and the sow; less often of ruminants. The great size of the gravid uterus and the abnormal pressure upon the viscera and upon blood-vessels, accounts for this. Observant breeders give their mares pulped mangels, and swedes or apples, and middlings or linseed, a little while before they are due to foal, this laxative diet favoring the production of milk as well as preventing accumulation of hardened feces, or too great quantities of ingesta.

Diarrhea.—This condition of the bowels needs no description. It is an expression of irritability of the mucous membrane, arising from a variety of causes. Frequently but an effort to expel some indigestible or unsuitable food, it may also be the result of specific or constitutional disease, as infectious scour in calves, and intestinal tuberculosis in adults. Horses, cattle, and sheep, scour when taken from hard tack or winter rations and put on green meat or turned into pasture. Worms set up an irritation leading to diarrhea. More especially is this the case with calves and lambs afflicted with strongyles. It is obvious, then, that no single remedy will suit all cases, but that the origin of the disease should be sought and removed. Long abstinence and the worry of being taken to market, and carried or driven about, and then a full meal at the end of the day, is a frequent cause of scour or diarrhea in calves, and is to be distinguished from the infectious malady which will be found under Troubles of the New-Born (at page 238).

In adults it is nearly always due to some form of indigestion, and may be remedied by judicious dieting. Besides the above, we cannot but attribute to nervous disorders, or temperament, the diarrhea seen in some horses, notably great performers on the track. They will be normal so far as the excreta are concerned, while in the stable, but as soon as they observe preparations being made for harness work, or a "washy" hunter recognizes the sounds which precede a hunting day, they will begin to scour with excitement. Lambs, pigs, and puppies, when weaned and before they get accustomed to new ailment will often scour, and such ailments can be dealt with successfully, but the constitutional or specific forms, and the nervous, do not offer much hope of cure. It may be taken as a good general practice, to clear out the contents of the canal. Diarrhea is proof for itself that the ingesta are doing harm and not good, and we may minimize the results of fermentation by helping to cast out the injurious material. Hence the apparently contradictory but successful custom of giving castor oil or other simple aperient. After the unloading comes a period of renewed capacity. Acute diarrhea will, however, be accompanied with more or less pain and loss of appetite and health, and astringent remedies are needed. In the chapter on medicines will be found some recipes for scour mixtures, and the reader will use his discretion in prescribing for the various subjects of diarrhea. Among the most approved drugs may be mentioned opium, catechu, cinnamon bark, bismuth, chalk, kino, bael fruit, and many others, and these are combined with cordial or carminative substance such as ginger, and pimento, and cardamoms, peppermint and dill water. The prescriber will choose his remedies subject to many limitations as to his means of administration, and give powders on the tongue to dogs, in the trough-feed to pigs, and will perhaps medicate the horse's food in the manger, and give balls or drenches to cattle. (See Administration of Medicines, at page 424.) It is enough perhaps to have indicated the class of remedies required, while directing special attention to the importance of both seeking and removing the cause.

Superpurgation.—This is to be distinguished from diarrhea because artificially induced by accidental or mistaken medication. It may of course happen to animals of all species, but the horse is the most frequent victim, and in view of his value, the most important. Moreover, his constitutional peculiarities render him a dangerous subject, seeing he is known to die from this cause, as he is from continued intestinal pain without any special lesions: as when colic is prolonged. The Table of Doses (at page 443) should enable the intelligent reader to apportion the amount of an aperient with sufficient accuracy, and it may be said that a considerable margin is permissible without ill consequences; a little too much or a slightly inadequate dose, owing to miscalculation of weight, or the condition of the patient, will be of no great consequence, and we will pass on to mention the chief cause of superpurgation. It consists in the administration of a second dose too soon after the apparent failure of the first to act. This fact should be very clearly understood by the student, and he is here warned against giving a second ball of aloes in less than a week after the first. It will sometimes happen that the desired effect of a ball is not obtained, owing to inadequate preparation (see Physicking, at page 363), or a large mass of innutritious fibrous material in the stomach and bowel has absorbed a part of the dose, or the ball has been given in a waxed cover which has taken longer to dissolve and the action of the drug has been delayed. Unless some special reason exists, as in colic or impaction (which see), it is well to wait and see if copious draughts of water with the chill off will not set up the desired movement in the canal. To give another ball on the top of the first, is to invite that superpurgation which may become uncontrollable and result in the death of the patient.

The symptoms need not detain us; they are similar to diarrhea, otherwise induced, but persist, and are accompanied by lowered vitality, or shock, as it is conveniently called. The animal loses all desire for food, his extremities are cold, pulse weak, eyes glazed, breath foul-smelling, and rectal evacuations offensive. Pain, evinced by cramping up the belly, arching the back, and pawing, may precede a cessation of the purging, and this perhaps on account of the emptiness of the canal; or it may be followed by fever in the feet, which sudden transfercnce is referred to under Laminitis (which see at page 349).

Treatment includes attention to surface warmth as the temperature is subnormal save in the injured region. Clothing from head to foot; the latter including bandages of some woolen material. A warm apartment, a rousing stimulant, as a quarter pint of brandy, and if pain is much in evidence a combination of anodynes as advised for colic of the spasmodic type (see Colic, at page 100). Eggs and milk whipped up with smaller doses of brandy and chlorodyne will be advisable every two or three hours until the patient shows some little signs of brightening up, and loss of that hang-dog expression which predicts a fatal termination. If the patient doesn't hand in his checks he must be nursed back to his ordinary diet through the stages of arrow-root, corn-flour, rice, eggs and milk, to fine meals of oats and wheat-flour and peas. The mistake is often made of giving linseed, but not of the laxative foods recommended in the article on sick foods should be given in superpurgation, and the irritable condition of the bowel should be kept constantly in mind, and plenty of time allowed for a gradual return to hard tack, and the postponement of any sort of work until good digestion is established, and the patient's manner is gay and vivacious.

Dysentery.—This disease differs from diarrhea whether caused by disease or induced by drugs, in that it is a destructive inflammation of the mucous membrane of the bowel whereby sloughing and ulceration is a sequel to purgation, accompanied by blood and strings or patches of mucous lining. The amount of constitutional disturbance is greater, and the discharges are peculiarly offensive. Occurring, as it often does, in insanitary surroundings, it is thought to be due to some malignant organism finding a suitable habitat in irritated mucous membranes. The fact that it follows on superpurgation and other prostrating condition, favors this view, but a specific organism has not been identified.

Besides the symptoms alluded to above, there is increased temperature; a tendency to subnormal temperatures being noted in purgation from other causes than specific constitutional maladies; the sufferer is hidebound, prostrate, soon emaciated, and has throughout, a quick but feeble pulse. Dysentery does not as a rule terminate in the death of the animal in a day or two, but is apt to settle into a subacute form in which the animal lingers for weeks, and eventually dies worn out by the disease.

Treatment consists more in affording favorable conditions and supplying a suitable diet than in any medication. Good air, dry bedding, and the foods recommended for superpurgation, are to be advised. The free employment of disinfectants to make the atmosphere of the stable wholesome is important when the outer cold compels us to close doors and windows. The astringent remedies mentioned for use in diarrhea and superpurgation should be given in conjunction with internal disinfectants. Of these, carbolic acid in glycerine is one of the best. Chinosol is another that has given good results. (See Astringents and Table of Doses.)

Convalescents need much time and care, but recovery, if it does take place, is usually complete.

Enteritis, Inflammation of the Bowels.—No species of domesticated animal is exempt from this frequently fatal malady, but the horse is the worst subject, for reasons already alluded to in connection with colic and superpurgation. It more often affects the small than the large intestine, but both are frequently involved. Commencing in the mucous lining, it extends into or invades the other layers, and the whole intestinal wall suffers.

Causes.—We have very little light upon this subject. There must be some special cause which has hitherto eluded the pursuit of the pathologist, and escaped the observation of the clinician, and so we fall back upon the suggestion that it is caused by such things or circumstances as we have known it to follow; vicissitudes of weather, vegetable poisons or ferments, chemical irritants, obstructions and chills following on wading through cold water.

Symptoms.—These are often mistaken for colic in its less acute form, and valuable time is thus lost. An uneasy pawing or scraping back of the bedding, and an apparent irresolution as to the advisability of lying down, mark the onset of the disease, but there is elevation of temperature, which we have said is not a constant symptom of colic but rather the exception. The coat stares, the appetite is lost, the breathing is quicker and shallower, there is great depression of spirit, and the passing of small quantities of dung. There are none of the remissions of pain which are noted in colic. The pulse is from the first, small, hard, and quickened. The membranes of the eye are red, and the little blood-vessels corded or standing out. The clammy or dry tongue of fever is seen. The above signs if compared with colic (at page 100) will enable the student to distinguish the disease from spasmodic colic. If he should have any difficulty in respect of flatulent colic in its less obtrusive forms, he may note the difference in the shape of the belly. In flatulent colic the hollow between the ribs and hip first fills; then a general distention follows. In enteritis, the abdomen has the appearance of having been pushed up from underneath, and compelled to extend itself laterally. From the depressed condition, the dull, stricken behavior of a beast mortally ill, the subject of enteritis may pass to a period of excitement, and conduct himself in the manner of one suffering from acute colic; but he will not do this at first; more often there is a continuation of the early symptoms above described, frequently going down, looking round despairingly at the flank, " changing the place but not the pain," rising again and standing with lowered head and anxious countenance, and occasionally swishing the tail. The manner of lying down is so different from a horse with acute colic. In the latter case, as we have said elsewhere, the animal throws himself down rashly, almost angrily: in enteritis he gently lowers himself and finally touches ground with a suppressed groan. This manner is commonly observed throughout the illness, but those cases which run on to delirium will of course differ; a demented animal behaving in much the same way no matter what the origin of his madness. (See Mad Staggers, at page 93.) The surface temperature varies much, some of the extremities will feel cold, others warm, and patches of sweat may appear upon the body. The inaction of the bowels must not be mistaken for ordinary constipation but will continue throughout. Insensibility to light, drooping ears, pendulous lips, sighs, unsteadiness or reeling, precede the fatal moment when the animal collapses upon the ground to die. If the patient is to recover, the improvement will take place early in the attack; the symptoms abating and the animal taking more interest in his surroundings, perhaps asking for food when he hears the sieve. We cannot leave this long description of symptoms without referring to the frequent mistake made by persons in charge of horses suffering from this malady, when a period is reached at which coma takes the place of the delirium previously mentioned. There is a cessation of the active signs of pain, and the attendant reports the animal as better, but that he will not take food. The expert finds him sinking. The products of inflammation have poisoned his nerve centers and his heart is failing, no pulse can be felt, the extremities are deadly cold, and it is only a question of time before he falls and dies.

Treatment.—The number of recoveries from enteritis are comparatively few. It is one of the most fatal of equine diseases, ruminants showing a higher percentage of restorations to health. They apparently suffer less acutely, make but slow progress, and waste very considerably. It is generally thought that the constipation should not be combated by aperients, but that anodyne remedies to allay pain should be given to tide over the period of distress, and that with restoration, the peristaltic action will be restored. Hence we give those sedative and pain-killing remedies advocated in colic. There is, however, considerable evidence in favor of a bold dose of calomel, which appears to act more as an antiseptic and sedative than as an aperient, or its cathartic action is delayed until a time when it is beneficial. Half an ounce of calomel with as much powdered opium in a ball, at the commencement, has certainly appeared to confer much benefit in the practice of the writer. This is one of the diseases in which the hypodermic syringe is valuable, as enabling us to get the maximum of anodyne influence from drugs, without the stomachic action we desire to avoid, and morphine may be frequently administered without fear of destroying appetite or adding to the constipation which we have said is constant throughout the attack. We may assist the bowels by injections of warm glycerine or of soap and water; keeping the gate open, so to speak, for the feeble action going on within may never quite cease. The products of decomposed and retained ingesta may be counteracted by the administration of half dram doses of chinosol dissolved in water. All sorts of laxative foods (see Foods for the Sick, at page 418) should be offered, and any sign of returning appetite regarded as hopeful. The question as to the desirability of bleeding is often asked. Perhaps the best answer to it is to say that bleeding in a full-blooded young animal in the initial stage may be beneficial, but later, and in horses in average condition, no good can be expected, as there is such rapid loss of vitality that depletion at the source does not commend itself to those who have seen most of the disease. The inflamed tissues examined after death show purple or deep-red portions with an effusion of discolored jelly-like matter between the layers. In cattle this will be distinguished from Johne's disease, not only by the symptoms during life, but by the post-mortem appearances.

The greatest care is necessary with convalescents in gradually returning to their ordinary diet, and in the avoidance of any aperient medicine: reliance being placed on laxative foods and the restoration of peristaltic action and natural unloading of the contents of the canal.

Ruptured Intestine, or Burst Gut.—This accident may be caused by falls or by distention by food or gas, possibly by violent spasm during colic, but a careful examination after death frequently leads to the discovery of a weak place; a degeneration from previous disease, a denuded portion caused by dysentery or nests of worms, or the irritation of a stone formed within, or of a foreign body, and in old animals of a wasting or atrophy of the walls. Apparently healthy animals have died of burst gut when thrown by ropes on a full stomach for operative purposes, and hunters have died through coming down a buster with crossed legs. More often than not, it occurs as a final giving way of weakened structures without any special known circumstance leading up to it.

Symptoms of ruptured gut are not so definite as to enable us at once to pronounce upon it. They resemble those of twisted intestine, of volvulus or intussusception, and of lacerated liver. In sudden and mortal illness there is an expression which those accustomed to animals distinguish from that which only indicates pain, however acute the latter may be. In the griped horse the pain is probably as acute as any the animal ever experiences under any circumstances, but he does not wear facial expression of shock or deadly illness which none can describe, however familiar they may be with it. The recognition of such appearances will enable the doctor to say " this animal must die," but his pupils must each learn to read the signs for himself. We have known all sorts of men who could recognize it, many of whom had no experience of sick animals. Partial sweats and variable temperature of the extremities, a pulse at first quick and irritable, and presently running down and finally becoming imperceptible, trembling, blowing, bloodshot eyes, and at the same time pallid mouth membranes; these are among the chief symptoms of a broken bowel. There is no period of remission as in colic, from which the attendant should find no difficulty in distinguishing it.

Intestinal Obstructions. Blocked Gut.—Impaction has been referred to (at page 108), and causes of acute pain or colic arising from indigestible food, but there are obstructions of another class, as strangulated bowels by twisting, or looping, or by the presence of bowel stones. On either side of the block the normal functions are going on, or would go on but for the arrest of movements along the canal. Thickening of the gut, growth upon it, tumors and foreign bodies and intestinal accretions varying in consistence and in some cases indistinguishable from rocks whose surfaces have generally become smooth, and whose shapes partake more or less of the contour of the gut in which they have lain on one side with perhaps a flat facet, where contact with a similar stone has prevented further accretion in that direction. The composition of these stones is dealt with at page 118.

Intestinal obstruction, whether from such substances or other causes referred to above, give rise to acute illness of which the symptoms vary from mere colicky uneasiness to those agonizing pains we have mentioned in connection with the spasmodic form of colic at its worst. (See page 100.) The looped, twisted, or entangled gut is sometimes diagnosed and distinguished during life from the stone-blocked bowel by the greater intensity of the pain: the obstruction due to a stone is in some cases acute and steadily progressive. Whatever the cause of obstruction there will soon come a time when no more evacuations result from administration of clysters, or any apparent action follow on the administration of aperients. There will be some of the distention noted in connection with flatulent colic, and before the end is reached, the running down pulse, sweating in patches, trembling, swaying, and fear of lying down. (See Ruptured Bowel, Ruptured Stomach and compare with Enteritis at pages 100, 113.) There is an attitude depicted in our illustration which is more diagnostic than anything else, although as previously stated the symptoms vary very much. The absence of any passage since a certain time will eventually assure the owner of obstruction, although he may never know the actual cause if the patient recovers.

In the above remarks we have had the horse only in mind. He is the chief sufferer. He is more liable to bowel concretions or stones than other species, both on account of his anatomical peculiarities, his often exclusively dry feeding, his chances of longevity, and the nature of his labor. The ox is by habit more lax, and his food of a softer and more aqueous or oily character. Except in the case of foreign bodies attracting indigestible fibre, cattle have no opportunity, so to speak, of forming stones. The same conditions apply to sheep and deer. The life of the pig is short, save for a few sows kept to an unprofitable age, and these for the most part receive a laxative diet. The dog, with his habit of eating bones, and a predisposition to constipation, is not rarely the victim of obstruction either from concretions which have formed within him, or from swallowed stones while playing with them or carrying them for the amusement of his human friends.

Treatment.—Many a surprise awaits the stableman who picks up stones in the manure of an animal that has never ailed a moment, so far as is known. Many a lot of stones, and some of considerable size, have resulted from a long-needed aloetic ball, and if there were no other reason for an occasional physic ball, it would be well to give one twice a year to clear out or prevent possible causes of obstruction. An aperient has been advised in colic (see page 100), and this is one of the reasons for such advocacy. There are others. Obstruction of bowel, whether regarded merely as constipation or a dietary consequence, should always be feared and never treated lightly. (See remarks on signs of constipation at pages 107 and 108.)

The choice of remedies is large, and we may prefer to employ repeated doses of linseed and castor oil, with a view to gradual softening of a mass which we fear is contained in a strained gut that has suffered previous attacks of colic, or in an old horse whose intestinal walls may be suspected of being thin and easily ruptured. (See Ruptured Gut and its causes at page 116.)

Table salt and sulphate of magnesia in much bulk of warm water may be chosen, as saline substances when very dilute act by osmosis. Hot fomentations and packs encourage movements within, and small dogs may be given warm baths, or made to sit in warm water up to their chests. Massage of the abdominal walls is of value in their case also. Enemata are generally employed and may encourage a sympathetic peristalsis, although not actually reaching the obstruction.

Eversion or Inversion of the Rectum.—As a result of straining during constipation or in parturition and under other circumstances, it sometimes happens that the terminal portion of the bowel known as the rectum or *arse* gut is turned out. In young pigs it is common in cold weather, if they are fed on swill or distending substances. In horses and cattle its great volume and the persistent straining offer some difficulty in its replacement. Its red, round, and firm appearance easily distinguishes it from any other portion of the viscera, but if it has protruded more than a short time, it darkens in color, swells badly by interruption of the circulation, and an effusion of serum between the layers, and the frightened or irritated animal is liable to do itself a mischief by rubbing against a wall or post.

Treatment.—If recently expelled we may attempt to repose the gut at once with hands anointed with carbolized oil or other suitable antiseptic. If swelled, we may make several superficial pricks with a clean lancet to let out the serosity and reduce the volume, also fomenting with warm water. In horse or cow, the purplish mass with which the novice is confronted appalls him, but he will find it less difficult to replace the gut than to retain it when there and should be provided with a clamp (see West's clamp, page 221), or in the absence of that invaluable appliance, some stout suturing material and a surgeon's or glover's needle, with which to take deep and strong hold of the substance of the anus. Some little help may be gained by securing the tail with a cord and passing it between the legs, and fastening to the collar round the neck, or a surcingle or belly-band. Pigs are easily managed, as they can be held up by the heels, and the weight thrown forward, while the fingers push the gut in, and secure the anus in the way already described. In sows and larger animals it is sometimes necessary to slough off a portion with nitric acid, but the subject loses condition, and is a long time getting back to its old form. The patient should have very little food for the first day or two, and then of a laxative kind which will not provoke straining. This remark does not apply to little pigs whose blown bellies forced out the gut in the first instance; these should have a few solid grains of corn to munch and amuse them, and afford a stay to their stomachs while the bowels regain tone, and the belly contracts. Stitches should be removed about the third day, but it is better to allow a little accumulation inside, than to take away their support prematurely.

Diseases of the Liver.—Animals in the field, living a natural life, are seldom troubled with disorders of the liver save such as occur through the infestation of parasites, a number of which make their home in its ducts. These will be more particularly considered under the heading of parasites, fluke or liver rot, etc. Constitutional diseases such as tuberculosis, affect the liver. (See Tuberculosis, at page 40.)

Stabled horses fed on corn to be turned into so many foot pounds of lifting power or energy for work, and other species overfed for meat or milk production, are at once placed in an unfavorable environment as regards the liver, and its functions are therefore often disturbed. Among the most frequent troubles may be mentioned:

Congestion of the Liver.—Any surplus of blood in the organ over and above that required for bile production and the maintenance of its structures, constitutes congestion. If the outpouring of blood is hindered by valvular disease of the heart, or vessels are blocked by nests of parasites or pressure of larval cysts, of tubercles or morbid growths, it is thrown back upon the organ. The effects of bad air upon the lungs in close stables, react upon the liver, and induce chronic lung troubles, whereby the exchange of blood from the right to the left side of the heart is interrupted. The most common cause of liver congestion, however, is rich feeding and insufficient exercise, and this applies both to pampered horses, stall fed cattle, sheep, and pigs. Dogs are especially prone to it, owing to their love of the fireside, and the indulgence accorded to them in the way of rich meats.

Symptoms.—Imperfect digestion is a common one, and often accompanied with loss of spirits, a pasty tongue and sour breath, constipation or else looseness of the bowels, with a disposition to break wind or to be distended by its accumulation in the bowel. It should be understood that the function of bile is to act both as antiseptic in preventing decomposition of the food, and to stimulate the movements of the gut. The products of the liver are complex, and its offices should be specially studied in works on physiology, but for our present purpose we may profitably bear in mind the uses of the biliary fluid when discharged into the duodenum, or the sour state of the ingesta when such outpouring of bile is arrested. Increased number and diminished force are noted in the pulse, and in acute cases, pain on pressure outside the organ. The appetite is fitful or suppressed, and the visible membranes often take on a yellowish tint.

Treatment.—The selection of a suitable purgative early in the disease is important. Dogs and pigs benefit by blue pill, as given to their masters, and followed by salines. Horses and cattle profit more by a bold dose of aloes and repeated small daily doses of salts of potash and soda and magnesia. (See Table of Doses at page 431.) A convenient method is to give these salines dissolved in water and mixed with the food or in the drinking water, if the patient will so take it. Castor and linseed oils should not be given, although so much valued under other circumstances. In a few acute cases, it is advisable to apply mustard to the skin over the right side, and employ clothing to keep up surface circulation and withdraw blood from the central organs. Many old practitioners favor blood-letting from the jugular veins as being the most rapid method of depletion. Convalescents improve rapidly on dilute phosphoric acid and tincture of nux vomica and the nitro-hydrochloric acid much diluted. Green food or bran mashes and pulped roots should form the principal food, until a healthy action is shown by the returning color and consistence of the evacuations.

Jaundice, the Yellows, Icterus.—Any obstruction to the flow of bile from the liver into the bowel may result in the yellow staining matter of that secretion getting into the circulation and producing the familiar yellowness which, in man and beast, has long been called jaundice. Experiments have proved this much, as when the gall duct has been ligatured; but jaundice occurs without our being able to assign the cause, and whatever it is, Nature sets about remedying it in most but not all cases. It appears also to yield to treatment in the majority of instances if early undertaken. Post-mortem examinations have shown no great changes in the liver although death has ensued, and on the other hand, livers which have undergone degeneration have not caused jaundice during life. German pathologists have attributed the frequency of jaundice in dogs to an inflamed condition of the small gut (duodenum) whereby the opening of the gall duct has been occluded. The dog's liver is very large in proportion to his size. There are reasons for this, having regard to his mode of life and special requirements.

Symptoms.—The yellowness of the human countenance has its counterpart in the visible membranes of animals inside the ears and under the skin of the belly and between the pads of dogs' feet. In horses and cattle, the white of the eye and the mouth membranes, give us plenty of evidence if we are familiar as we should be with their coloration in health, and not deceived by the frequent modified yellow tinge of old animals whose livers have performed their function indifferently for a long time. Such chronic discoloration we note in men who have spent much time in the tropics, but it is not of such a marked kind that we should think them to be suffering from present jaundice. The stabled horse of mature years may have such yellow tinge, yet enjoy fair health. The evacuations are unhealthy for want of the bile which has gone astray. They are pale clay-colored, and often covered with mucus, and other times there is an offensive diarrhea, due to fermentation. The mouth feels sticky and dry, and the breath smells ill. A harsh and staring or hidebound condition of the skin is frequent. A somewhat slow pulse and loss of energy is common. In some cases the discoloration is first seen in the urine, and its high color is specially marked in dogs.

Treatment.—This will be influenced by our view of the cause. For instance, we shall get no great results in a sheep whose razor back and dropsical belly tell us of advanced " rot " or fluke disease, of which jaundice is but a symptom. Nor shall we expect a cure in a coughing old cow with tubercles in the substance of the liver. The degenerate liver of the pampered old dog will respond but indifferently to medication. The rest, which constitute quite the majority, will give good results if we commence with a purge and follow up with salines as advised for congestion of the liver at page 120 (which see). The same instructions as to laxative and green foods apply here, and in dogs the withholding of all fatty substances. Fresh air and compulsory exercise have a great influence in restoring the subjects of jaundice.

Inflammation of the Liver. Hepatitis.—The causes which give rise to congestion of the liver (see page 120), contribute to the more serious condition of inflammation of the actual substance of the organ; not the mere overloading of its vessels with blood. This distinction between congestion of an organ and inflammation should be quite clearly understood by the student, who is invited to refer to congestion and inflammation of the lungs at pages 174, 177. Hot weather, badly ventilated stables, rich food, and insufficient exercise are believed to cause this trouble, but we have a strong suspicion that some such agency as gives rise to " yellow jack," will ultimately be found. We have seen a few cases due to external violence.

Symptoms.—A dreamy, drowsy, drooping dulness, hanging of the head with drooping eyelids, and more or less yellowness of the membranes and a facial expression of lassitude and indifference to surroundings. Urine very dark in color and offensive in odor, marks this malady. It yields a deposit of solid matter when cooled. Variable condition of the dung, from hard and coated with mucus to loose and full of bubbles, first one and then the other being observed in the same patient at different times. Pain is evinced when the right side is pressed with the knuckles, there is fever in proportion to the severity of the case, and not infrequently lameness of the off fore limb. The formation of abscess in the liver is marked by very high temperature and much pain, or severe prostration as in foals, infected through the navel. (See Troubles of the New-Born, at page 243.)

Treatment is not so hopeful as in other disorders previously considered. Ipecacuanha helps to unload the liver of bile, and acts upon the skin, and the bowels can be kept acting by doses of magnesium sulphate, plentifully diluted. A blister on the right side may be tried, and surface warmth promoted by clothing and bandages. A fast of one clear day is recommended, and a restricted diet of easily digested food afterwards. (See Foods for the Sick, at page 418.)

Chronic Inflammation of Liver. Cirrhosis.—A gradually progressive but permanent change in the connecting tissues of the liver, as the result of a low, chronic form of inflammation. This differs from congestion in not specially affecting the vessels by engorgement, and from acute inflammation by not having its seat in the hepatic cells themselves, but in the thin material which connects and holds together the liver cells, or true gland substance.

Gradually, but surely, this *interstitial* connective tissue enlarges, and squeezes out of existence the hepatic cell. Such a process necessarily leads to progressive failure of the functions of the organ, nor does there seem to be any preventive remedy. The hypertrophied condition, particularly in human subjects given to alcoholism, has been described as "hob nail" or "gin liver," but the charge of intemperance will not lie at the door of our four-footed friends who get cirrhosis. On the other hand, we have seen apparently healthy livers in men who have lowered thirty odd whiskies daily, for many years, and whose autopsies we have awaited with much interest. The liver is truly a wonderful laboratory, and full of surprises for anyone who, like the writer, has practised among the very poor and had abundant opportunity of making post-mortem examinations for coroners. We have the advantage in the case of animals, of examination after death, which is often, nay, generally, denied by sorrowing human relatives.* If the resulting contraction of the organ interferes with the portal veins, there will be dropsy of the abdomen. The symptoms during life are those of chronic indigestion, irregularity of the bowels according as bile is intermittently poured into the canal, or not produced in sufficient quantity to act as an antiseptic to the contents, staining of the membranes and of the urine, of the hairless portions of the skin, sour breath, pasty mouth, perverted appetite, and all those signs noted in connection with other disorders of the liver, but in a less pronounced though more lasting form: besides which, the failure to respond to treatment points to chronic degeneration of structure.

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* A young friend at this point says he is not so sure that it is all advantage and would have liked my job as a ship's surgeon, where he could dump his subjects without an autopsy by a board of seniors.

Treatment.—This is not very hopeful, since we cannot under any circumstances undo structural changes. Can we arrest them? It would seem that in many cases the process actually stops in horses that have been restored to the natural life of the field, if given a sufficiently long time in which to recuperate. The remaining sound portion of the organ acquires extra powers and functional activity and is such as to provide all the necessary bile for the animal to enjoy good general health again. This is proven by subsequent return to work, and by examinations conducted post-mortem, which lead us to believe that arrest took place at a certain time and in an area we can point out. We have known dogs with degenerate livers to recover when their owners have gone abroad and put them on board wages.

Fatty Liver. Fatty Degeneration.—The liver cells always contain fat globules to a greater or less extent, but by a fatty liver we mean one in which excess of fat within the cells is pressing upon the true hepatic substance to its detriment, or else has taken its place: fatty degeneration. It is not the disease of the poor man's horse or dog, nor is the cow who uses up her tissues for milk making, a frequent victim of fatty liver. It is often seen in tame rabbits and fowls, artificially fed for slaughter. Brewers' horses and others kept "big" for exhibition, the idle pony of the old lady, the indulged pensioner; these are the subjects of fatty liver, and so of course is the pet dog. The abuse of condiments is a contributing cause. These of course help to induce fatty liver in cattle made up for fat-stock shows, but their lives are short, and it is not of such importance if they are to be brought to the block.

Symptoms.—Only when the liver has been oppressed with fat for a length of time does it rebel in such a form as to offer us any definite signs of what is amiss. Distention of the abdomen, flatulence, uncertain appetite, and excessive fatigue after very little exertion; these are the chief signs of fatty liver.

Treatment.—A lowered diet, increased exercise by slow degrees, aperient medicines, choosing the salines in preference to anything oily. If the case is merely one of infiltration with fat, and not substitution of it for hepatic cells, the above treatment will effect a cure. A long turn-out at pasture may arrest the degenerative process as in cirrhosis (which see at page 124).

Rupture of the Liver, Burst Liver.—A fatty or congested liver is more liable to rupture than is a cirrhotic one, as the latter is a hardening process. The breach may be so small as to give rise only to pains simulating a mild attack of colic, or it may be a rent which leads to much hemorrhage. If the strong, investing membrane (Glisson's capsule) is not broken, the animal may not die, but if this has given way the bleeding into the abdominal cavity can only be followed by dissolution. How do we know this? The answer is simple. Many livers examined after death have been found to have repaired small breaches, and a patch up has occurred in large ones for a time only. No recovered large rent in the capsule has ever been found.

Symptoms.—There is a certain resemblance in the symptoms when any internal organ gives way, but a broken gut has usually been preceded by pains of colic (see Colic, at page 100); but in ruptured liver any acute symptoms of pain may be absent. The signs are rather those of hemorrhage, nausea, and collapse. The animal, if a horse, "turns his nose up," that is to say, elevates his head and slowly erects the upper lip, sighs, and lowers it again: the same behavior as we note when a horse smells something that disgusts him. The membrane of the eye will be found more or less blanched, or with a little yellowishness which was there before, and will not deceive us as to the general pallor so characteristic of loss of blood, and differing from the paleness of anemia. The dilated pupil and staring, glassy eye, the cold ears and legs, and the feeble if not imperceptible pulse, all point to internal bleeding. Patches of sweat break out upon the body, and with fading senses the animal stands with forelegs apart, fearing to fall, swaying, trembling, and finally collapsing in a heap. Considerable differences in the conduct of the horse dying of ruptured liver and ruptured bowel will be noted, as well as in the color of the membranes (see page 116).

Treatment.—If we can make a successful diagnosis, we are not likely to succeed, save in those minor fractures alluded to. We may administer acetate of lead, gallic acid, tincture of iron, turpentine and alcohol in the hope of a clot forming. If the bleeding is stayed the reparative process may be expected.

Dropsy. Abdominal Ascites.—An accumulation of fluid within the abdominal cavity goes by the above names. It consists, not of water as is popularly supposed, but of a serous or sero-fibrinous fluid which will behave differently outside the body from water. Its viscidity and the presence of fibrin often hinder us from successful tapping, as it is called. If the peritoneal membrane is inflamed (peritonitis) there may result an accumulation of this fluid, but more often dropsy is caused by some interference with the functions of the liver; some hindrance to the portal circulation. It also occurs quite frequently as a consequence of semi-starvation. We see it in young horses as well as cattle stock that have wintered badly, in poverty-stricken lambs, in sheep with fluke, and in puppies hand-reared upon inadequate or insufficient food. In sheep there is usually the added sign of dropsy of the jaw: a "cog" showing between the *rami*. Chronic diseases of the heart, the liver, and kidneys also lead to abdominal ascites. The big bellies of old brood mares, and of cows with many rings upon their horns, may be due to the pressure exerted by successive uterine tenants upon the abdominal veins which have permitted their fluid elements to escape through the walls.

Symptoms.—The earlier ones are often overlooked and only the big belly attracts the notice of the owner. These are a want of animation, harshness or loss of bloom in the coat, tightness of the skin, and general feebleness. With the pendulous disposition of the abdomen there is muscular wasting, particularly of the loin muscles; a very marked feature in sheep suffering from rot. A feeble, thready pulse, and a blanching of the membranes of the eye and nostril accompany the disease, and in many animals swellings of the limbs. The latter may "fill," as it is called, from other and less serious causes. (See Big Leg, page 32.)

Dropsy is so often associated with impairment of the functions of the liver, that we must not lose sight of the fact, but keep it always before us in trying to form a diagnosis. We shall look for any discoloration of the membranes which have been described as blanched, and estimate the probabilities as when affecting sheep, if a number are dropsical, and fluke is known to be about, or if in a stable of horses where several cases have occurred following on a change of food. We shall suspect imperfect nutrition where a number of young stock are concerned, and so form an estimate as to the probabilities of successful treatment.

Treatment consists in removing any ascertainable cause, and placing the patient under more favorable conditions. Considerable assistance may be gained by the expulsion of parasites, by the supply of iron for blood making, and bitter tonics such as quinine and gentian, and assisting the kidneys to carry away surplus fluid by the use of diuretic medicines in combination with other tonics. (See Table of Doses, at page 431.) Tapping or the operation of paracentesis is seldom of any real service, but affords temporary relief to subjects with a sentimental value such as dogs.

Spasm of the Diaphragm.—The midriff or muscular expansion which divides the chest from the belly is occasionally thrown into violent spasm, but the exciting cause is not known. It may follow on a burst of speed or take place in a horse standing in the stable. Puppies with worms are liable to it. It comes on suddenly and shakes the whole body by its violence. The thumping noise is often thought to be caused by palpitation of the heart, but a moment's observation will satisfy the listener that the sound comes from further back in the animal's body; amidships, in fact. Some accumulation of nerve force in the pneumogastric branch is the probable explanation, but these explosions are like laughter, difficult to explain although similar in origin.

Treatment.—A dose of alcohol with an anodyne or sedative; such as two ounces of spirit of nitrous ether, and four drams of compound tincture of chloroform and morphine in a pint of water for a horse or cow. (See Table of Doses for other animals.)

Hernia or Rupture, Strangulated, Scrotal, Ventral, Umbilical.—The word rupture is frequently employed in this work in the sense in which surgeons use it; ruptured tendon or muscle, or ruptured organs, stomach, liver, etc. But the lay reader more generally understands rupture to mean an extrusion or displacement of some abdominal organ or portion of it, particularly of the bowel. Hernia has been defined as "the protrusion of an organ or part of an organ from its proper cavity," whether as the result of a rent in the tissues, or an escape through a natural or imperfectly closed orifice. A torn-open abdomen and escaping gut may be given as an example of the former, and an inguinal or umbilical hernia of the latter. Ruptures are conveniently divided into congenital and acquired; the former being present at birth, the latter occurring subsequently as the result either of accident or disease. Congenital hernia will be considered most conveniently among the "Troubles of the New-Born" (pp. 238-246). Acquired hernia or ruptures are brought about by overstrain from without or within: excessive extension of the abdomen in jumping, racing, rearing, kicking, pulling of a heavy load, or pressure from the presence of gas within, or the efforts put forth in parturition. Horned beasts inflict wounds which cause hernia; and other injuries to the abdominal walls from spikes, stakes, stable prongs, etc., have brought about like results. Ruptures are called reducible, when the displaced structures can be put back by simple manipulation. When they cannot be so reposed they are said to be irreducible. Strangulated hernia is a condition in which the extruded organ is suffering from pressure because the orifice through which it escaped is too small to permit free circulation of blood. A familiar example of this results from horning: the hole made is small, and the bowel comes through slowly but persistently, until such a mass accumulates outside as to constrict it at the opening, besides the weight of an increasing volume retarding circulation, and promoting rapid swelling, much inflammation, and mortification if not soon replaced. Strangulated inguinal hernia in the horse is almost confined to entires, as the operation of castrating has the effect of withering the cord, and promoting closure of the orifice through which the intestine may otherwise escape. The pain of strangulated hernia resembles that of other acute intestinal troubles (see Colic, at page

100), but a peculiar symptom frequently noted, is a disposition to sit down on the haunches like a dog; an attitude very rarely adopted by horses. There is a stiffness in walking, and a sympathy with the testicle on the affected side which influences the cremaster muscle, and results in the uplifting and lowering of the organ at frequent short intervals.

Inflammation quickly follows unless relieved, perspiration breaks out upon the scrotum and flank, the pulse and respiration are quickened. The symptoms mentioned should be sufficient to arouse the owner's fears as to what is really the matter, and his examination should extend to the manipulation of the cord of the testicle, which will be found swollen in sympathy; he may perhaps feel a bulge or knuckle of intestine. No time should be lost in emptying the rectum with a greased hand which should be pressed downward and outward towards the internal abdominal ring. Here probably the imprisoned gut will be felt. Judicious traction will in many cases result in its release, if employed before fibrinous adhesions have occurred. An immediate sense of relief is shown in the animal's behavior, and nothing more but careful dieting may be needed and reduction of the abdominal pressure by fasting. Failing to withdraw the bowel in this way, we must lose no time in casting and chloroforming the animal. With hind legs drawn forward, while kept upon his back by bags of provender, we have the weight of the intestines now in our favor, and may repeat our efforts per rectum, while an assistant presses with fingers and palms upon the protruded bowel. If this measure fails we must resort to the knife. With sterilized instruments (see Antiseptics, at page 410), we proceed to cut through the skin and dartos muscle underlying it, keeping the cutting edge of the scalpel always outward, to avoid wounding the gut. We dissect from the peritoneal sac (tunica reflexa) containing the imprisoned portion of bowel. The next thing is to find with the finger the place where the gut has come through the belly-wall (inguinal ring). This has to be slightly enlarged in order to put back the bowel. The special risk is that of wounding the intestine. With one hand keeping back the bowel, and with the cutting edge of the knife covered by the fingers of the operating hand, we finally get the sharp side against the ring, and press gently as we feel the " stitches " giving way until enough space or sufficient opening has been obtained for our purpose. The gentle pressure of our fingers here, and the traction inside which our helper is giving us, will be enough to draw in the gut. This is not an operation the amateur should undertake if it is possible for him to obtain professional assistance, yet it is just one of those emergencies in which the bold horseman with some elementary knowledge will take the risk and save a valuable animal when a surgeon cannot be found in time. The amateur so provided will very likely have suturing material, and a sample or two of surgeons' needles. If he has soluble sutures in antiseptic bottles, so much the better, as he can then weave a sort of spider's web across and across the opening in the abdomen which will act as a shield while adhesions are naturally formed, and the sutures themselves will be dissolved and carried away when no longer required.

Scrotal Hernia.—Inguinal hernia has been spoken of as being felt in the entire horse and as affecting the spermatic cord on the side where it occurs. In true scrotal hernia, the escaped intestine or mesentery is not held in the inguinal ring of the belly, but descends down into the purse. Very often, indeed, hernia in the scrotum is a condition present at birth (see Methods of Castration, at page 368), and may be withdrawn during the growth and development of the colt. On the other hand, an unlucky strain may give rise to this form of rupture in a previously sound adult. A horse so affected may do years of useful work, but there will always be a risk of the hernia getting strangulated. In pronounced cases, the bulging and increased volume of the purse will suggest hernia, but may be due to dropsy, and the most careful examination should be made to ascertain whether the contents are fluid or feeling doughy and solid, and consisting of mesentery, or easily compressible and suggesting to the touch, gut from which the gas is easily expelled. The contents of the purse will be found to vary: sometimes hard, sometimes easily compressible, and at other times apparently empty. A consideration of these things will enable the owner to decide if he will take the risks of keeping the animal entire, or submit him to the knife of the gelder.

Ventral Hernia.—Not through any natural opening or aperture of abnormal proportions, but through a breach in the abdominal wall, the gut may escape, as in the horning example previously mentioned. This is what is called ventral hernia. Old mares, cows, ewes, and occasionally other animals get broken bellies from the attenuation or atrophy of the abdominal walls. The treatment already mentioned in connection with horning, applies to most kinds of ventral hernia, but for the aged mare or other beast whose flank has given way there is no remedy.

Umbilical Hernia. (See "Troubles of the New-Born," at page 246.)

CHAPTER IV

DISEASES OF THE URINARY APPARATUS

THE diseases of the urinary organs are not so numerous or complex in animals as in man because they are less subject to violent emotions; they do not exert themselves unnecessarily and sacrifice sleep to ambition, or employ alcohol and tobacco to arrest the metamorphosis of tissue, which is the cause of fatigue whether of brain or body. Most of the troubles which afflict animals in this region are induced by the artificial conditions of domestication, or else by parasitic invasion. The office of the kidney is to separate waste tissues (urea and salts) from the blood, and having passed them from tubes called ureters into the bladder or reservoir, to expel the fluid at convenient opportunities. The involuntary outflow is prevented by a sphincter muscle similar to that supplied to the teats and on a larger scale to the anus. The accompanying diagram shows the apparatus quite plainly, and further detail can be had in any work on physiology, as the principles are the same in man and beast. The composition of urine varies greatly according to the circumstances in which an animal is placed. A horse at work, or other animal called upon to exert itself, will pass more solids or urine of greater specific gravity. Highly nitrogenous foods in the idle animal have the effect of increasing the urates or matters in solution and suspension. A sudden change from winter forage to green meat will excite the flow of thick milky-looking fluid. Cattle and sheep allowed an undue proportion of mangels, swedes, or turnips, show the effect in excess of clear fluid in which salts are but indifferently dissolved, and from which a sandy matter is quickly deposited. (See Retention of Urine, at page 134.) Great variations in color and composition and specific gravity are consistent with health. In regard to the stabled horse, the reader is asked to bear this specially in mind, as generations of stablemen have run away with the idea that something is wrong whenever a horse passes thick urine, and much damage is done by the unnecessary employment of kidney stimulants or diuretics, as they are called. The importance of observing the excretions of animals has elsewhere been insisted upon. The man in charge of animals should learn to know urine in which foreign or pathological products are present, and that which is merely abnormal from dietetic causes. For example, we may point to red-water in cattle, and to bloody urine, neither of which conditions will be mistaken for thick urine due to food of a particular kind.

Urea is quickly converted into ammonia, outside the body, and it is therefore quite natural for decomposition and a precipitate to take place in urine left upon the floor of the stable.

Retention or Stoppage of Urine.—The partial or complete interruption of the flow of urine may arise from several causes, one at least far distant from the apparatus, namely, the brain or spinal cord. An example of this is seen in the cow that is down with milk fever, so-called. Spasmodic constriction of the neck of the bladder, either from local irritation or from sympathy with the bowel in colic. With the relaxation of the spasm in the intestine, the sphincter of the bladder is in sympathy, and the griped horse urinates as a result of the ease obtained, while the stableman, seeing him pass urine after putting tobacco in his sheath, credits the recovery to his own performance. (See Spasmodic Colic, at page 100.) The presence of stones, either preventing escape from the bladder or blocking the urethral canal at any part, may cause retention of urine, also morbid growths, polypi, cancer (epithelioma chiefly), and swelling of the sheath.

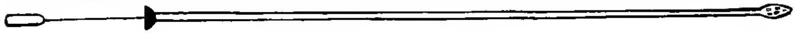

FIG. 9.—MALE CATHETER.

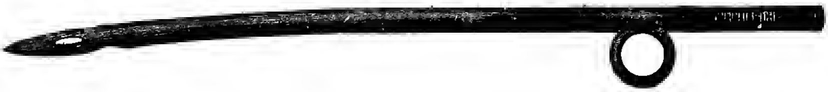

FIG. 9A.—FEMALE CATHETER.

Horses may be unable to pass urine from having been compelled to retain it too long under circumstances precluding them from posturing, and all the ceremony some require, including a groom to whistle to them. This custom of the stable is associated in the mind of the horse with a respite from any interruption, and so really does promote urination. Every animal left alone, and free from distractions, will of course relieve himself, but there are peculiarities about horses which we do well to consider. The writer has had some that would not stale with a bridle on; others that must be stripped of their harness altogether, and mares for whom the breeching must be lifted. Quite a number of light harness horses will not pass urine away from home, unless straw or other bedding is shaken under them. We may desire to break individuals of such inconvenient fads, but we do better to humor them when such habits are once established. Retention of urine among cattle and sheep is often caused in the males by a deposit of sabulous or sandy material in the worm-like end of the penis, or within the sheath and about the tuft of hair which commonly grows in this situation. Feeding with too many "roots" is a cause, and rams and bulls are more troubled than steers or castrated sheep. It should be known to farmers beyond professional assistance, that the vermiform process may be cut off in bad cases, without interfering with the fecundity of the ram. Old dogs suffer from retention of urine through the enlargement of the prostate gland and consequent diminution of the caliber of the canal. Dogs above all other animals are victims to retention, through neglect to take them out of the house where they have been taught to hold their water.

The symptoms are not difficult to understand. The patient, of whatever species, makes frequent and ineffectual efforts to relieve himself by assuming those attitudes with which all must be familiar. Often a few drops or a little trickling of water will be observed to leak away rather than to be expelled by the animal's own efforts.

Treatment.—The cause should be sought and if possible removed. In the case of the larger animals, manipulation will often afford the required evidence; the pendulous and swollen penis of the horse may be blocked half way up with a stone which we can feel from the outside, or in any other portion of the canal we can get contact with by passing a catheter. It is possible in many cases, after syringing up some oil, to finger down the stone from the outside, or if the stoppage is near the bladder to push it back into that viscus. It is no very serious operation if a stone is lodged where we can feel it, to cut down on to it with a clean single incision: take it out, suture the wound, dress with an antiseptic, withhold water for a couple of days, giving only a very little damped food, and healing will probably take place. (See Stone in the Bladder, at page 140.) Urine cannot be passed in some instances, from temporary loss of contractility of the bladder, or structure so slight as to be easily overcome by pressure of the hand within the rectum, and we should always clear this portion and make a careful examination, unless already sure of the cause. The syringing into the rectum of a quart of warm water in which a dram or two of extract of belladonna has been dissolved, will very likely relieve the spasm, or a flow of urine may be produced by a little pressure from the hand within the bowel. Sedatives or anodynes of the same character can be brought near the seat of grief by syringing up the urethral canal: a five to seven per cent. solution of cocaine will answer the purpose where pain is the active cause of constriction of the neck of the bladder, or the spasm of the sphincter muscle. Warm poultices on the loin and gentle aperients also favor the passing of urine unduly retained. Dogs may be given a warm bath. Horses, mares, cows, and dogs of both sexes can be relieved by the catheter. (Fig. 9.) The yard of the male should be drawn, and while one person is engaged in passing it (previously oiled), another should be in a position to press upon the bulge it will produce as it rounds the arch under the anus. A little timely compression will direct the instrument so that the curve is negotiated, and the end directed into the bladder. Once there, it acts as a syphon when the stilette is withdrawn, or slight suction induced at the other end by a syringe. In the mare and cow, the orifice is to be sought upon the floor of the vagina, where it is covered by a little fold of membrane. A short catheter is more convenient, but a male instrument will serve. (Fig. 9A.) The bone in the dog's penis does not prevent the passage of a catheter, but the smallest size obtainable for infants may be required in the case of a very little dog.

Incontinence or Leaking.—When this occurs with adult horses, or mares, or in cows, it is generally due to paralysis of the sphincter muscle, to which reference has been already made, or to partial obstruction by calculi or morbid growths, or the lodgment of foreign bodies, and treatment is not attended with much success unless the offending substance can be got at and removed, as advised in connection with retention of the urine. The involuntary passing of urine in timid puppies and highly nervous dogs, particularly of females, is due to relaxation of the sphincter muscle through a mental influence which may be compared to the involuntary blushing of young persons until the will power is more fully developed.

Diabetes, Polyuria, Profuse Staling.—What is commonly called diabetes in horses, is not so understood by pathologists, as the urine does not contain sugar, and with few exceptions is curable. Some few genuine cases of diabetes occur, and in dogs are not rare, although in these animals the profuse urination is mostly due to other causes. These affections are scientifically distinguished as diabetes insipidus, and mellitus.

Any check to the functions of the skin may provoke temporary polyuria, but more often it is caused by indigestion, and in horses and cattle, by heated hay or artificially dried oats, or other cereals. The symptoms need no description, but it may be noted that the excessive quantity of water passed is almost colorless and transparent, and therein differing from normal urine. With this condition of things the animal rapidly loses flesh and capacity for work.

Treatment.—Horses and cattle benefit by a dose of aloes; about half the quantity which would in other circumstances produce a fair purge. After this, iodine is found to be almost a specific, and is given in doses of a dram of metallic iodine, with a like quantity of iodide of potassium made into a ball with linseed and syrup or treacle. This dose daily. A third more may be given to a large bull or cow. Dogs should be purged with castor oil, and the dose of iodine apportioned to their weight. (See Table of Doses, pp. 431, 432.) If the good effect of iodine is not immediately apparent, alternate doses of fifteen grains of sugar of lead should be tried, or a dram of powdered nut-galls. It is essential that all mowburnt hay or other damaged forage should be withheld. Linseed-tea should form a part of the daily ration. (See Sick Foods, at pages 418, 419.)

A milk and farinaceous diet is prescribed for dogs.

Bloody Urine, Hematuria.—This is to be distinguished from red-water (which see at page 20). It is not urine reddened by the coloring matter of blood, but urine having blood in it, either mixed freely or in streaks or clots. Much importance attaches to the above distinction. If blood is equally distributed throughout the water passed, it may be assumed to have come from the kidneys and have had the opportunity of diffusing itself in the contents of the bladder. If it comes in clots, or irregularly mixed, it may be from an injury anywhere throughout the urethral canal, as, for instance, from a stone wounding the lining membrane.

Treatment.—Remedies taken into the circulation either by way of the mouth or hypodermically injected, will be more likely to take effect upon the lacerated kidney than those intended to constringe the membrane of the canal, for which purpose it will usually be best to syringe up it with solutions of tannic or gallic acid, to which may be added some glycerine as an emollient. Cold applications to the loins, as cloths soaked in water, or pounded ice in a bag, are advised. A laxative dose, preferably of oil, should be given, but aloes and other drugs which act as kidney stimulants must be avoided. Cold water syringed into the rectum will also check bleeding from kidney or bladder. Perfect repose and demulcent foods should follow. (See Sick Foods, at page 418.)

Inflammation of the Kidneys.—This disease is caused by chills when clipped horses are exposed to the cold after exercise. Stallions more often suffer than other animals, and the cause has often been traced to giving cantharides (Spanish fly) to excite sexual appetite towards the end of the season when the natural powers are exhausted. It has happened too, when mares in use have been blistered upon a limb, or some part of the body. The abuse of diuretic medicines to promote urination, or to make the skin shine, also accounts for some cases of inflammation of the kidneys. Cattle are not so liable as horses, but long railway journeys, fatigue, and exposure have the same influence upon other animals. Dogs may have it through kicks, and falls, and other forms of violence.

Symptoms as of colicky pains are generally present, and horses frequently extrude the penis and withdraw it from the sheath. The urine is thick, and passed in small quantities which appear to scald the membrane, as the animal groans after each little emission: the whole quantity passed in a day is far less than in the ordinary way. Stiffness of the hind legs, sometimes arching of the back, a disposition to go down, and a fear of doing so, shown in a hesitating manner, cringing under pressure of the fingers over the loin, an expression of pain is seen in the face, the eyes are reddened (injected), respiration hurried, temperature increased, the mouth feels hot and clammy, and patches of sweat about the flank or other parts may appear at intervals.

Treatment.—An oily aperient, warm poultices over the loins, rectal injections of warm water with a dram of extract of belladonna, demulcent foods (see Sick Foods, at page 418), linseed-tea and barley water as a drink. Acute pain may be relieved by hypodermic injections of morphia. If poulticing cannot be practised, a liniment of ammonia should be rubbed into the loins, but none containing Spanish fly or turpentine, as these may be absorbed and do injury.

Inflammation of the Bladder, Cystitis.—The lining membrane only may suffer, or the inflammation may extend to the other coats and involve the whole structure. The causes are in many respects those which give rise to inflamed kidney, as chemical irritants or mechanical ones such as calculi or stones, or from long retention of urine and its decomposition and precipitation of salts. In mares, cows, sows, and bitches, it may result from difficulties in giving birth; especially where much force has been employed in delivery. Morbid growths and foreign bodies have accounted for some cases, but how some inches of bramble can get into the bladder is rather a puzzle. The author has seen such a specimen, all coated with the same material as goes to form cystic calculi, and it must therefore have been in that situation for some time.

Symptoms are much like those of inflammation of the kidney (which see above). When sexual irritants have been the cause, the horse is specially prone to frequent extrusions and retractions of the penis, and the vulva of the mare is spasmodically everted. The urine is blood-stained or thick, almost muddy, and sparse in amount. When the hand is introduced into the rectum and pressed upon the bladder, the pain evinced is almost diagnostic and distinguishes between inflammation of the bladder and kidney.

Treatment.—The irritating qualities of the urine should be corrected by copious draughts of linseed-tea and barley-water varied with milk and white of eggs. Ounce doses of bicarbonate of potash in the drink help to neutralize the urine and promote a healthy condition of the mucous membrane. If cautiously executed, the injection into the bladder itself of warm glycerinated lotions with a small amount of atropine or belladonna extract, soothe the organ. It is important to open the bowels, and while waiting for the action of a dose of oil, the rectum may be mechanically unloaded and warm soapy injections sent up. It will be observed that belladonna is frequently mentioned in connection with urinary troubles as nothing else appears to have so direct an anodyne and restorative effect, and if the person in attendance has sufficient skill to frequently irrigate the bladder with such lotions as above mentioned, he will be more likely to succeed than by any other medication. When the odor of the urine is suggestive of decomposition, it may be desirable to change or alternate the urethral injections, employing a two per cent. carbolic and five per cent. glycerine lotion, in water of the temperature of the body. A one or two per cent. chinosol lotion may be used with glycerine, but permanganate of potash is incompatible with this otherwise valuable substance. (See Disinfectants, at page 410.) The patient may be kept under the influence of belladonna internally administered, until relieved. (See Table of Doses for different animals, at pages 431, 432.)

Stone or Calculus in the Bladder.—The damage done by the presence of stones or calculi is subject of frequent mention in connection with urinary troubles, but what are the special exciting causes or predisposition to these formations we do not know. They are said to be more frequent in millers' horses. The presence of lime in the drinking water has been suggested as a cause, but inquiry in limestone or chalk districts elicits no confirmation of this very plausible theory. That the solids are precipitated from the urine and form upon a nucleus of perhaps nothing harder than a little thickened mucus, is proved by making sections. There is a greater disposition to fasten on to more solid objects as the bramble, previously mentioned. Given a crystal or two of any of the salts of urine on the floor of the bladder, and the conditions for accumulation exist. Many analyses have been made, and the composition is found to vary within limits, but from sixty-one to eighty-seven per cent. of a bladder stone will consist of carbonate of lime, from three to eight per cent. carbonate of magnesia, and from two to seventeen per cent. of oxalate of lime, besides five to ten per cent. of organic matter, and a very little water. They vary too in different species of animals. They seldom attain to any great size in cattle or sheep, more often occurring in numbers of irregular-shaped stones. In ruminants, it has been observed elsewhere that there is a tendency to the precipitation of sabulous or sandy material in the urine and this either passes away or accumulates in the peculiar-shaped end of the penis. (See Retention of Urine, at page 134.)

Dogs will often have a great number of small calculi, and pass some of them in the urine, or large ones commonly ending in the death of the bearer, after repeated attacks of strangury.

Symptoms.—These are by no means uniform, but evince themselves, some by interruption in the passage of water, some by difficult or irregular emission, some by colicky pains and uneasiness, which disappear after the bladder has been emptied, and some by a suggestion of injury caused by a moving stone, or given rise to a little streak of blood in the fluid, or mucus and blood. These may have occluded the canal. (See Retention and incontinence and bloody urine, on previous pages.) Diagnosis is often difficult, and operation requires a good surgeon. In past times, medicines were freely given (lithontriptics) of an acid nature, under the impression that stones consisting chiefly of alkaline carbonates might be decomposed, or at least hindered from further growth. This would no doubt occur if the remedies came into contact, as can be easily demonstrated outside the body, but acids given by way of the stomach must come in contact with the alkaline fluids of the duodenum, and in other ways be so changed before entering into the circulation of the blood, as to have little or no influence upon solid stones lying loose in the bladder. It does not follow, that because an animal has stone in the bladder that he must soon succumb to it. Its increasing weight is even a chance in the victim's favor, because the weight will often have the effect of keeping it out of the way of the outlet for urine and will even form a pouch to remain in: nay more; a slight inflammatory attack will result in adhesions or thickening of the membrane around the stone, in such a manner that it will remain quiescent until some rare cause of disturbance occurs, such as a fall head over heels, or the spasms of colic and the agonized rolling of the sufferer. For this reason stone is often unsuspected until it causes the death of the bearer.

Once a diagnosis is made, an operation will be the only effectual remedy. This needs the anatomical knowledge of the surgeon, and no one else would attempt it unless thrown on his own resources. The writer has seen some wonderful cures effected by bold amateurs who were not intimidated by the responsibility of failure, where the subject was their own property. To one who has performed it there is nothing very formidable, however.

Eversion, or Expulsion of the Bladder.—In the pains of parturition the bladder of the female is sometimes forced out. The fatal mistake has been made of supposing this to be the fœtal envelopes or water bladders containing the unborn, and puncture of it has followed. If the owner is not familiar with the structure, he may set all doubt aside by a careful examination of the upper and front part of the protruding mass, where he will find the openings of the ureters by which the fluid is conveyed from the kidneys into the bladder.

Treatment.—With antiseptically prepared hands, we may gently but firmly, and without intervals of doubt and hesitation, push it back into the vagina, and seek upon its floor for the meatus, or opening through which the bladder came, and slowly finger it back into its place. This is not so difficult if the operator is called upon to repose the viscus directly it has escaped, but if time has elapsed there is much swelling, and the mucous membrane is extremely liable to tear. Gentle compression between warm flannels may help to reduce the volume, but the chief difficulty is the opposition of the patient herself. She is excited and moves across and across, and strains as if something had to be expelled instead of reposed.

A five per cent. warm solution of cocaine helps us to overcome this difficulty, or we may put the animal under chloroform. The latter will generally be the best plan with a large and strong, and perhaps savage bitch, or a very small one where very precise handling of tools smaller than fingers will be required, such as a blunt bone penholder. For the retention of the bladder, a West's clamp (Fig. 21) is advisable, or in its absence, stitches with a wide margin to prevent tearing out. Mares and cows may be made to stand with their front feet lower than their hind ones. Smaller animals can be trussed, and little dogs nursed in a manner to prevent them from injuring themselves. (See also Coming Out of the Womb, at page 224.)

CHAPTER V

DISEASES OF THE NERVOUS SYSTEM

THESE are more serious than numerous in animals, and insanity as we know it among men is rare. Rabies, or canine madness as it is called, is communicable to all species of animals. (See Rabies, at page 36.) Any derangement of the circulation by which either too much or too little blood is supplied to the brain, results in excitement on the one hand, and drowsiness on the other. The exalted function may go to the extreme of delirium, and the drowsiness amount to stupor. The mental faculties are chiefly influenced when the great hemispheres are affected, but the locomotor functions are interfered with when the cerebellum, or little brain is involved. The latter, together with the first portion of the spinal cord, called the medulla oblongata, control or co-ordinate the muscles, and disturbance of their functions gives rise to fits, and uncontrolled spasmodic movements, and paralysis. The brain may be regarded as the central office from whence instructions are telegraphed along the nerves, and any disturbance here necessarily causes distant effects. It is often possible to diagnose the portion of brain concerned by the effects manifested. The blindness known as glass-eye, in which the organ remains transparent and indeed perfect in itself, can be assigned to the central substance of the brain where the optic thalami are found. If they are incapable of receiving impressions through the optical instrument we call the eye, then the animal is blind, although having sound eyes. Paralysis of one side indicates some fault on the opposite one of the brain. We cannot pursue the very interesting subject of the brain and its functions in a work of this kind, but the reader will have no difficulty in obtaining physiology books from any reference library. The spinal cord is a main trunk, and if divided or sufficiently pressed upon at any portion, there will be paralysis behind that portion, the current being cut off. Some of the chief brain troubles of animals are reflected ones; arising, that is to say, from digestive disturbances, and acting on the brain through the great pneumogastric nerve which has many important branches innervating the bodily organs. Stomach staggers may be given as an example. The presence of hydatids (an intermediate life of the tapeworm; see Tapeworms, at page 397) and other parasites give rise to brain troubles in animals; rarely indeed discovered in man. The giddy sheep is an example of this sort of cerebral disturbance. The cerebro-spinal functions are disturbed by some constitutional diseases, as influenza in horses, tuberculosis in cattle and pigs, and distemper in dogs. Either the brain substance or its coverings may be inflamed, in which case we call the malady cerebritis, or meningitis. So also with the spinal cord. Its substance may undergo red softening in dogs after distemper, or its meninges, or covering membranes be affected by a peculiar disease commonly mistaken for rheumatism, and known to veterinarians by the formidable name of chronic ossifying cerebro-spinal pachymeningitis. There are, too, brain troubles due to the sexual organs, but these are confined to females which become sexually mad for a time (nymphomania).

Cerebritis and Meningitis.—When the substance of the brain is affected by inflammation, there is loss of sensibility and consciousness, with more or less paralysis: when the meninges are the seat of inflammation, there is great excitement, delirium, convulsions, and much pain. There is no more pitiable sight than an infant suffering from tubercular meningitis, nor a more dangerous subject than a horse delirious from phrenitis. The pulse is not so much influenced by inflammation of the substance of the brain as when its coverings are involved. It will be perhaps slow and full in volume in the former, and quickened but more irritable in the latter. Loss of will, of sensibility, and the power of motion, characterize inflammation of the brain substance; pain, convulsions, and frenzy mark the aggravated forms of meningitis.

Sleepy Staggers.—In this we have an example of brain engorgement, not inflammation of the coverings. The dull expression and drooping eyelids which are first observed, lead presently to a semi-comatose condition, in which the head droops and the patient supports his chin upon the manger, or pushes his head against the wall, and if suddenly disturbed, staggers until he can collect his wits with more or less difficulty. The drooping ears and utterly sleepy condition will be easily recognized, and needs no further description. It sometimes happens that this drowsiness passes into an opposite condition, and violent excitement and even frenzy follows. It may be supposed that in such cases the meninges have also become involved, or that ruptured stomach has followed. The writer has seen both after death. Cattle, sheep, and tame deer suffer similarly.

Treatment.—If early recognized, recovery may be expected, provided that a bold aperient is given. (See Physicking, at page 363.) This is one of the few diseases in which the modern doctor deems it advisable to bleed. If several quarts of blood are taken from the jugular vein there will be immediate improvement. (See Bleeding, at page 393.) Purging answers the purpose quite as well, and is all that is needed in a mild case, or one that is immediately recognized: but supposing the animal has not been seen until the malady has made considerable progress, his life may depend on the prompt employment of the lancet, and the author thinks that every modern stock owner should learn the ancient art of blood-letting, either with lancet or fleam. (See Bleeding, at page 395.) During the engorgement of the stomach and bowels, there is danger of rupture of the one or the other by the pressure of gases, eliminated from the great mass, and to guard against this, antiseptics may be given at intervals, such as carbolic acid, chinosol, permanganate of potash, hyposulphite of soda, etc. (See Disinfectants and Antiseptics at page 410.) It may be necessary to rouse the slumbering patient with doses of ammonia: the aromatic spirit of sal volatile being the preferable preparation, and it should be freely diluted. (See Dose Table, pp. 431, 432). Cold applications to the poll at short intervals are helpful, and horned beasts can have a bag of pounded ice attached. Convalescents should be fed very sparingly, exercised regularly, and the state of the bowels watched, to guard against any constipation which may bring back the malady.

Megrims, Vertigo, Giddiness, Staggers.—A sudden giddiness may seize an animal owing to direct exposure to the sun, to indigestion and disordered liver, to brain tumors, parasites, or too much or too little blood in the head. When all these known causes are reckoned up, there remain cases of megrims which more resemble fits in other species than the horse, and for which no reason can be assigned and no lesion be found by the most careful post-mortem examination. Indeed this may be said of all subjects of fits, and of most nervous disorders. Minute sectional examination of the brain and spinal cord under the microscope fails to reveal anything, and we are still very much in the dark as to the real pathology of nervous disorders. There are a few facts in connection with megrims in horses, and fits in calves, pigs, and dogs, which have for the most part been noticed by previous generations, and merely confirmed by the observant of this. Collar pressure hindering the return of blood from the head is undoubtedly provocative of megrims, and many a horse will go in a piped collar (one that is made to allow space for the windpipe), that would be useless or dangerous with an ordinary collar, but some horses will take on a fit of megrims when ridden at a walking pace on a level road. I have been "left" by such a one myself, or should have been, if not in possession of something with which to promptly bleed him. Horses subject to megrims frequently change hands. There is no means of telling them in the sale yard, although a few experienced veterinary doctors recognize a certain expression of countenance which suggests vertigo. If one knows the history of a case, he may to a great extent guard against recurrence of the attacks, by keeping the bowels lax, beginning a journey slowly, and never pushing a horse at a hill, or allowing him to wear a collar that presses, work on a full stomach, or be watered before feeding, etc. But each successive owner has the same motives for passing him on, and the like temptations to dispose of an animal with no outward sign of defects. Megrims varies greatly in intensity. In one horse it may amount to no more than a little hesitation and a short stoppage during which he shakes his head as if a fly had got into his ear, or the bridle was bothering him, while in a more pronounced case, the shaking is succeeded by a sort of paralysis, and the animal sinks to the ground, and if in harness breaks a shaft, probably, or does other damage. In a few minutes, as a rule, whether the fit is slight or severe, he recovers and resumes his journey apparently very little the worse for the fit. An aloetic ball every three months will do much to reduce the risk. When the fit seizes him the bars of the palate should be cut, as the flow of a very little blood is followed by relief.

Abscess in the Brain.—This may be caused in horses by external violence, by secondary formations in the disease known as strangles, and in cattle and swine by tubercular deposits. The abscess of pyemia may also form in the brain. This disease is seldom correctly diagnosed during life, although similar formations in other parts of the animal may suggest it, when symptoms of drowsiness begin and persistently increase, until the patient sinks and dies in an unconscious condition. No treatment would be of the slightest use even if we could accurately discern the abscess.

Epilepsy, Catalepsy, Fits.—In our opening remarks on nervous disorders, we have already said that the cause of fits is obscure. The peculiar muscular twitchings, rolling of the eyeballs, and falling to struggle upon the ground, or becoming unconscious while prone, which pass under the names of epilepsy or catalepsy, are rarely indeed seen in horses, but are not infrequent in calves, and quite common in pigs and dogs. The presence of large numbers of worms in the intestines may be supposed to account for many cases, because the fits cease when the animal is freed from them. On the other hand, many subjects of fits have been found after death to be quite free from infestation, and animals known to entertain many such guests, do not have fits. That digestive troubles lead to circulatory troubles in the brain, is abundantly proved by such diseases as staggers (see page 93), and that changing the food and management is followed by restoration in calves, pigs, and puppies previously the victims of epilepsy. The diversion of blood to the bowels, and from the head, which a strong aperient dose produces, is in favor of the subject of any kind of fit, besides which, it carries away fermented ingesta and prepares the digestive organs for a fresh start. It is observed that many young pigs when they first begin to take food well from the trough, lift up their snouts and tumble over backwards in a fit that lasts but a short time, and that they are able to return to the meal before their fellows have eaten it all. It will generally be found where this is the case, that the piglings have been put on too forcing a ration or too abundant a quantity, before they have attained sufficient digestive power to deal with it. Maize, or barley meal has been given freely to pigs only able to assimilate sharps or middlings with milk, and this leads to disturbance of the circulation; the reflected trouble referred to, in connection with staggers in other species.

Treatment.—Purge. In all brain congestions, purge. In the case of young animals, worms are nearly always present in small or great numbers, and vermifuges should also be given. If fits continue after such measures have been taken, you are at least in the position of having removed the known causes; assuming that you have changed or reduced the ration. (See Purging, at page 363, also Worms, at page 400.) A blister behind the poll, or a seton, has been advised by some, and we know that one of the most eminent European specialists advises for children the use of cajeput and turpentine oils against the spine: a diversion is what is thus aimed at. (See Blisters, at page 466.)

Eclampsia, Fits after Parturition.—Not coming immediately after giving birth, but when animals have been suckling a too exacting family, a kind of fit happens that much resembles epilepsy, only that the animal tries to stand, and trembles, and blows. In the case of bitches, with their greater intelligence and love of offspring, the sufferer seems to hang on to consciousness by sheer effort, and by will-power refuses to fall on and injure her pups. All that is necessary for a cure is to remove the cause. It is rare in bovines. I have never seen it in a ewe, but frequently in sows and bitches, and occasionally in cats. A calmative dose of bromide of potassium or chloral (see Medicines and Dose Table, at page 431), and the removal of some of the young to foster-mothers, is advised, and the steady feeding up of the mother.

Chorea, or St. Vitus' Dance.—The erratic movements of some afflicted child will have come under the observation of every reader, and need not be described since they are the same in animals. It is rarely if ever seen in the horse, comparatively infrequent in other animals of the farm, but terribly frequent in dogs as a sequel to distemper. Treatment is most unsatisfactory, for we cannot ascertain the true pathology of the malady. The spinal cord of a dog with " the jumps," affords us no information when examined microscopically; we only know that it is an interrupted current, as when most of us witness the electric lamp playing similar tricks, but cannot ascertain why. Remedies which appear to benefit one dog, seem to harm another. Direct spinal sedatives, such as the bromides and chloral, have been found of service, and arsenic over a long time, has helped in quite a number of cases. The following mixture is advised by Mr. Sewell, M.R.C.V.S., the most famous of European dog doctors:

Bromide of Strontia, 1 dram. Fowler's Solution of Arsenic, 48 drops. Water to 3 ounces. Dose, from half a teaspoonful to a tablespoonful, three times a day, after food. This it will be seen is sedative, but in other cases the stimulus of strychnia is found useful. Eaton's syrup is then prescribed.

Stringhalt.—This is another puzzler among the nervous diseases. It is chiefly found in the horse, and in him is of the greatest consequence, but cattle and sheep are seen with it, and in dogs it is very comical. What causes this exaggerated conduct on the part of nerves innervating the flexors of the hind limb, is not known. Australian horse-breeders finding some colts get well after ridding them of worms, thought they had discovered the cause, but this has proved a mistake. Sometimes a long rest at grass results in a cure, or may effect only a temporary reduction of the trouble. It varies greatly in degree, being scarcely noticeable in some horses except on first coming out of the stable, or standing over from one side to the other, and in others growing so bad as to make the animal unusable; the foot striking the belly and affecting the center of gravity. Most owners seek a market when the animal is warm and looking at his best.

Apoplexy, Heat Apoplexy, Sunstroke.—The arrangement or classification of diseases is necessarily of a somewhat arbitrary nature, and apoplexy is taken here because the form in which it is most frequently seen affects the brain, and then the body and limbs, through failure of nerve current; it might otherwise be as well dealt with under circulatory troubles. We may conveniently consider apoplexy in two degrees, if not in two separate forms. In the milder cases, there would seem to be only an effusion or escape of serum, or the watery portion of the blood, through the sides of the vessels, and consequent undue pressure resulting in drowsiness, leading on to insensibility, and sinking down on to the ground in a manner resembling the collapse of an intoxicated person. The more serious and commonly fatal form of apoplexy is that in which a blood-vessel is actually broken, and from which blood pours out. If this occurs in the upper layers of the brain, some amount of disturbed function is witnessed, according to the extent of the hemorrhage and the pressure it exerts, but it need not be fatal. Such a state may result from severe blows or falls, but what more generally happens is that a vessel at the base of the brain gives way. Here there are many vessels, and from hence the great nerve trunks pass out through holes in the skull, to exercise their functions in controlling the organs of life, as well as the locomotor apparatus. Pressure from a clot of blood in such a situation need be but very slight to have great effects. The primary cause is generally of long standing, namely, degeneration of the blood-vessels, whereby they grow rigid and lose their elasticity, and so give way when extra strain is put upon them. One may almost pick out the men in a crowd who are liable to "a stroke" or "seizure"—which means apoplexy, by noting the rigid vessels at their temples, or above and slightly in front of the ears. They have undergone a calcareous degeneration, and the probability is that the vessels in the circle of Willis, share the state of those exposed to view. According to the amount of hemorrhage and pressure, will be the degree of collapse and paralysis following. Sudden deaths in the hunting-field and on the race-course are due to this rupture of a blood-vessel at the base of the brain, but a similar thing occurring in the lungs is called pulmonary apoplexy. In the case of clots of blood from the rupture of minute vessels in the brain, recovery may take place, if the animal is worth the trouble either financially or sentimentally, by the same process that occurs in the human subject of a seizure; namely, the gradual conversion of the clot of blood into fatty material, and then its absorption. As the pressure is removed so will function be restored—until another degenerate vessel breaks.

Sunstroke, or Heat Apoplexy.—There is much misconception about sunstroke among those who have had no experience of it. They imagine that the direct rays of the sun have some effect in striking the brain, as lightning might be supposed to do. This is not the case. It is a collapse caused by heat, and more especially by a high temperature accompanied by bad air, hence we find many cases of heat apoplexy in the holds of horse ships crossing the equator. During the South African war, many American veterinary surgeons had charge of animals sent by the British government from New Orleans, St. Johns, New Brunswick, and other ports, and their experience will agree with that of the present writer, who conducted nearly two thousand horses, that those animals in the lower holds, where sunshine is no more to be found than in a coal-mine, suffered most from heat apoplexy or so-called sunstroke. In New York and some other large cities, the excellent horse ambulance system enables many animals suffering from heat apoplexy to recover, as they are whisked away, almost in the twinkling of an eye, to a place where they can have cold applications to the head. Ice in bags or evaporating lotions or cold sprays, and heart stimulants can be given, such as ammonia and ginger, or alcoholic drinks, if the patient is sufficiently conscious to be trusted not to let the medicine go the wrong way.

In the horse ships above referred to, the majority of horses recovered, so long as cold sea-water could be thrown over them with a powerful hose; but in the warm water of the Tropics a very different tale was told in the log-book. A ball of three drams of carbonate of ammonia, a dram of ginger, or sweet pepper, or twenty grains of capsicum, acts as a rouser, but will not keep good very long and should be wrapped in tinfoil. Pure air and the use of a fan is a help. Sometimes a degree of paralysis is left after recovery, from the more urgent symptoms, but the rule is for animals to eventually get well.

Crib Biting.—This is commonly described as a "vice," but it doubtless has its origin in nervous irritability, *ennui*, or want of occupation, and in the imitative faculty which must also be assigned to the cerebrum. Cribbing, weaving, wind-sucking, are all of the same class, and a distinctly hereditary predisposition is shown in some well-known families.

Every effort should be made to break the habit when first formed, by feeding on the ground, and in a box or brick building with nothing upon which to lay hold with the teeth; and the trick may be forgotten or not indulged in. The same may be said for turning out on pasture, but with a real old wind-sucker, nothing will deter him. He will stand in a hundred-acre field, and keep tucking in his chin, and sucking wind until he is blown out to bursting point. A tight strap round the throat generally answers the purpose, as the sucking cannot be indulged in a manner that gives much satisfaction, although a few horses will try to do it even with a tight strap. The strap leaves a mark on the poll, or rather lower down than the poll-piece of the broadest bridle would come, and a rub there should put a buyer on his guard against a wind-sucker, whose digestion will certainly be impaired later, and his utility diminished by a trick that leads to flatulent colic, and sometimes to burst stomach or bowel. (See Ruptured Stomach and Intestine, Colic, etc., at pages 99, 100.)

Tumors in the Brain and Skull.—There are few veterinary surgeons who have not met with cases of brain tumor in horses, or butchers who have not discovered similar growths in the heads of slaughtered beasts and sheep, to say nothing of tuberculous pigs. The presence of such bodies leads to disturbance of function such as has been described in connection with other diseases of the brain, but there are no very definite symptoms, because the tumors vary in size, position, and the amount of pressure exerted on different parts of the organ. As a rule they form in the ventricles, or else in that fringe of vascular membrane called the choroid plexus. A bullock thus affected, may nevertheless be brought to the block in good condition; a cow kept through parturition and fed off; and the same applies to pigs with tuberculous deposits; but in the case of a horse we are face to face with a serious danger if we keep him; or a bad conscience if we sell him; or a heavy loss if we are good enough to kill him. Not owning one myself just now, I am fully convinced that the only righteous way out of the difficulty is to slaughter. The subject of brain tumor may behave quite rationally, and do his work well for a time, but without any warning, may carry you over a precipice or into a river without seeing either himself; or he may bolt in a crowded city. More often his swerving and "drunken" behavior will attract attention in time. If he is well purged, and blood-pressure in the brain reduced, he will go on for a while without displaying the old symptoms, but there usually comes a time when the tumor takes on more rapid growth, and then the poor beast wanders round and round in a circle, always going in the same direction, and finally collapses and dies, if he does not have a fit of delirium. I have a lively recollection of being the under dog in a case of this kind, when a powerful cart-horse demolished the stable fittings and knocked down several men who were assisting me. If space would permit, one might tell many stories about brainy horses, that would interest horsemen. How such subjects have been sold over and over again at auctions, until they became known, and how the writer has been called in consultation at very distant places, to meet the same animal, etc., but one mustn't spin yarns, however tempting. It has been said above that brain tumors often take on a sudden increase and with disastrous consequences, but the reverse occasionally happens, and the tumor shrinks by a process of absorption of its fluid constituents, and consolidation of its substance follows, with relief from the pressure previously exerted. Such things are witnessed by those whose love of knowledge is greater than their abhorrence of the malodorous knacker's yard. Here, too, we may see skulls with bony tumors on the inner aspect which have pressed upon the brain and caused its absorption to a sufficient extent to accommodate the tumor. Unfortunately, we cannot trace the life history of horses in the majority of cases, or we should discover that at some time or other there had been meningitis to a greater or less extent in a horse with bony growth impinging upon the membranes, and the owner probably sold out to escape future trouble, and the buyer was none the wiser, but made a very good speculation. This doesn't influence one, however, in advising a horse owner to get rid of a horse suspected of any kind of tumor in or upon the brain.

Inflammation of the Spinal Membranes, Spinal Meningitis.—This occurs in horses after excessive exertion, as in the overtaxed hunter, particularly if he has not been properly conditioned, or is below par from any reason. Overdriven cattle, and other animals exposed to hardships on long railway journeys, or on shipboard are liable to it. Of the three membranes (counting them from without inwards), the arachnoid and pia mater are those involved, except in a peculiar disease of the dog, presently to be described. Tumors of the spinal cord and abscesses, as well as injuries to the spine, may also induce it.

The symptoms vary with the intensity of the disease, and may come on quite suddenly with a shivering fit, shortly succeeded by paroxysms of pain about the spine, and later by spasms of the muscles of the limbs, causing them to be jerked up into the air and banged upon the ground. Loss of control is progressive, the fetlocks knuckle over, and the animal is unable to stand, being finally paralyzed entirely. Struggling fits on the ground, and spasmodic contractions of the neck muscles, resemble the symptoms shown in bad cases of tetanus, but the previous history of the case enables us to distinguish it from that malady. (See Tetanus, or Lockjaw, at page 51.) While the paroxysms last, the facial expression is drawn and anxious, the breathing hurried, the pulse quickened, the body covered with sweat, to be later relieved by unconsciousness and death. If the animal does not die from an acute attack, he remains a hopeless paralytic.

Treatment consists in affording perfect quiet, applying ice-bags along the spine, administering large doses of chloral, alternated with the bromides of potassium and ammonium, supporting with slings, and later, if there is sufficient improvement to warrant the continuance of remedial measures, administering iodide of potassium and nitrate of potash, and lastly, when all inflammatory symptoms have passed and only weakness remains, small doses of strychnia or nux vomica.

Inflammation of the Spinal Cord, Myelitis.—Seldom occurring by itself, it is more often through invasion or extension from the inflamed investments above mentioned, and the symptoms partake of the same character. Muscular paralysis is sooner observed, and failure of the organs essential to life.

Inflammation of the Membranes of the Cord in Dogs. (Chronic ossifying cerebro-spinal pachymeningitis).—To those who haven't forgotten their Latin, this extraordinary long name will go a long way to explain the disease. Its length would go far to please a German professor of languages. Until recent times, this disease was mistaken for rheumatism, and well it might be, for not only do the symptoms resemble it, but the same class of remedies quickly influence it whether we resort to the old or the new ones. Sometimes a fore limb is seized, and the dog owner is troubled to believe that the animal hasn't been injured or got a thorn in his foot. He will perhaps hold it up, and shriek or carry it with the fear of a gouty man who sees someone in jack boots approaching his great toe. Another time one or both hind legs will suffer, or the muscles of the loins, or the neck. The latter seem more or less in sympathy in all cases, and the dog gives vent to a cry of pain, if the chin is suddenly depressed—one of the surest means of diagnosis, it may be remarked. This spinal trouble differs very much from those connected with distemper (see Distemper and Chorea, at page 149), as it is not a sequel to some other malady but comes on without warning or preliminary suggestion. The very young are practically immune. It resembles gout, inasmuch as the middle period of life is generally reached before the disease is manifested; increases with age and at irregular intervals, and the patient usually succumbs to it at last.

Treatment.—The first two or three attacks in a middle-aged dog are generally cured pretty quickly by doses of 5 to 10 grains of acid acetyl salicyl three times a day, each period being a little longer and perhaps necessitating an increased dose. The next best drug—and we often have to make shift with the next best, when far from great cities—is salicylate of sodium; dose, ten to forty grains. In the later stages we may find colchicum wine, five to fifteen drops, and soda carbonate, five to fifteen grains, an advisable change. A milk and farinaceous diet is advised, and total abstinence from meat. Post-mortem examination shows thickening of the spinal cord membranes in varying degree, very advanced cases appearing to have deposit of bony material in the dura mater.

Paralysis.—Frequent references will be found to paralysis or a paralyzed condition in connection with all the diseases of the brain and spinal cord. By it we understand a loss of contractile power in the muscles, and a corresponding impairment of voluntary motion. This paralysis of motion is to be distinguished from paralysis of sensation, as when a part loses feeling. Each may exist alone, but they more commonly occur together. Paralysis is not a disease in itself, but a symptom of some disorder of the brain or spinal cord. When one lateral half of an animal is paralyzed, it is called hemiplegia. When the posterior half of the body is helpless, the name of paraplegia is given. The former is not infrequent in man, but is rare in animals. The latter is quite a common trouble in animals. A slight pressure upon the brain or spinal cord will result in imperfect control, or want of co-ordination of muscles, or the parts may be absolutely incapable of responding to the will, as in the case of a broken back. An animal unable to rise is often tested by the simple expedient of sticking a pin into him, and if he does not twitch or respond in any way, it may be taken that paralysis is complete. Peripheral, or local paralysis is often seen in horses as the result of bad bitting, and pressure of bridles or abuse of the twitch; the tongue hanging out and the lower lip being pendulous.

Treatment.—Unless the cause can be traced to pressure of a removable kind, such as an abscess or foreign body, the prognosis is not hopeful. Stimulation along the course of the nerve-trunk supplying the part, is sometimes attended with good results, and the administration of nux vomica or strychnine in small and increasing doses. Liniments daily employed, or a blister over the region is the method adopted. (See Table of Doses for various animals, Strychnine.)

Cerebro-Spinal Meningitis in Horses, Infectious.—This disease was first noticed in the United States in 1850, fifteen years later in Germany, and in another ten years had found its way to Egypt. In 1881, London, England, was visited by a severe form of it, many horses dying of paralysis. That it is infectious is beyond doubt, but the causal organism has not been identified. It was discovered by accident, that the blood of a horse suffering from this malady will cause paralysis to other species. A patient was bled by an English veterinarian, and some pigs and sparrows feasted upon the clot, only to display such signs of paralysis as the lookers-on described as "boozed," in the language of East London. Many practitioners regarded this and subsequent somewhat similar outbreaks as a variety of influenza or pink eye.

Symptoms.—These appear quite suddenly in the majority of instances, the sufferer being found prone, and either unable to rise or doing so with great difficulty. In a few cases, some preliminary dullness is observed, and stumbling, through inability to lift the feet properly. Paraplegia, or loss of power over the hinder half of the body, is a common development, but in others the muscles of deglutition are involved, and the horse swallows food or water with difficulty, or begins to swallow, and fails; letting the "quid" drop, or spurting the water back through the nostrils. Instead of the foregoing symptoms, a gradual and progressive paralysis extends over the body, and ends in excitement, or muscular spasms somewhat resembling tetanus. (See Lock-Jaw or Tetanus, at page 51.) These spasms continue until the animal is either frenzied, or collapses into unconsciousness, and dies. Unless complications arise during the progress of the malady, neither the pulse nor temperature are materially affected, and the breathing is normal. After death the membranes of the brain and spinal cord are found engorged with blood; the vessels standing out and distended, or actually ruptured, and clots of blood, or large quantities of serum are discovered in the space between the meninges and brain and spinal cord. (See Apoplexy, at page 150.)

Treatment.—No particular line of treatment has proved specially successful. First a laxative dose should be given. Cold lotions or ice-bags to the poll have been tried with some measure of benefit apparently, and in those cases where spasm of the neck muscles is a marked symptom, hypodermic injections of morphine have given relief. When the first sign of the disease appears in a stud, isolation and disinfection are advised.

CHAPTER VI

DISEASES OF THE RESPIRATORY ORGANS

If the reader will consult any popular work on physiology he will find anatomical illustrations, and the process of respiration explained. He has only to remember that quadrupeds carry their bodies in a horizontal position or to go down on his hands and knees to realize the relative attitudes between man and beast. For all practical purposes, the function of the breathing apparatus is the same, but in doctoring animals he will have to remember that the ribs are not in front of the animal, and if directed to apply mustard to the "chest" he will rub it into the sides of the chest behind the elbows in a backward direction, for here the chest walls are best exposed to medicaments. Another matter to bear in mind is the very great volume of the chest in horses and cattle, and the necessity of greater air space than is needed for human beings. In all respiratory diseases this need is pressing and the purity of the atmosphere should never be sacrificed to the desire to make the stable warm. Warmth comes from within, and we must conserve it by any amount of clothing and bandaging, if we have to make choice between cold air and bad. Nothing so completely convinced the present writer, of the value of pure air, as seeing the horses, of dealers in cheap horses, turned out in winter to cure themselves of bad colds. More valuable animals under his care, stabled and nursed, did not do so well as some of those left to take their chance. This argument may be pushed to the extreme, and that, as the immortal Euclid would observe, "is absurd." An occasional death took place among the dealers' lots, but the early recovery of the rest is sufficient proof that pure air is most beneficial, and we do best if we obtain the comforts of the stable and conserve the warmth by clothing.

Catarrh or Common Cold.—Before the well-known symptoms of a cold show themselves, there is elevation of temperature, more or less shivering or shuddering, as we express it when a cold sensation is experienced down the back. "It is when we shiver that we are hot," as a Hibernian professor told his class. It is quite true that increased temperature or fever is accompanied by these shivers or rigors, and that the person who declares he is in a burning fever has seldom any increase of temperature, as proved by the clinical thermometer. Congestion of the skin, with pressure on the nerve terminals is the cause of the "burning heat" complained of, not an increase of bodily temperature. Besides rigors, the animal that has taken a chill experiences a dryness of the throat, and pricking, burning sensation in the eyes, and inside the nostrils. How do we know? Well, first of all, we know that such sensations are ours, then we see the congestion of the membranes in the animal's eyes and nostrils, and presently the scalding tears and the running nose, and if we are familiar, as we ought to be, with animals in health, we shall have no difficulty in learning their language, or common means of expressing discomfort. Horses snort when the nasal membranes tickle or feel tight; they sneeze as we do; they half shut the

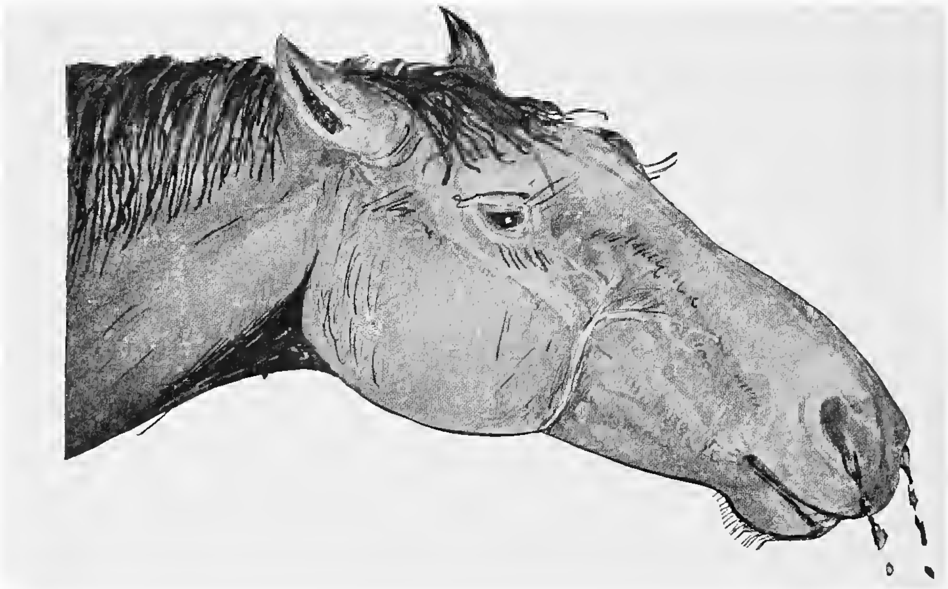

FIG. 10.—CATARRH, OR COMMON COLD.

irritable eye and blink to moisten it with the tears which flow from precisely similar lachrymal glands. They don't use a pocket-handkerchief, when a cold or thrilling story affects them to tears, but they prove the presence of a lachrymal duct, which runs from the inner corner of the eye right down the long face, and opens just over the border of skin that partly lines the nostril. There is a special reason for referring to this orifice, and the young reader is asked to lose no time in examining it in the first horse he can handle. We make no excuse for mentioning it here, and will refer to it again when speaking of glanders. (See page 27.) This curious little hole in the floor of the nostril has frequently been mistaken for a glanders ulcer, and the more readily, when a horse has a cold and the membrane around it is sympathetically inflamed, and a discharge is present in the chamber. The discharge is first clear, like the tears, and later grows thicker, and largely composed of mucus, and finally of a yellow appearance, and more or less glutinous when it is a mixture of pus and mucus—muco-purulent as it is called. The stage at which a common catarrh has arrived may be known by these distinctions, and they are important, because differentiating catarrh from glanders to some extent. (See Glanders and the other symptoms to be specially considered.) A common cold usually runs through the course of congestion, and discharges as above described, but has another importance besides that mentioned above, inasmuch as it leads to roaring, whistling, thick wind, and other chronic defects. A common cold may, by invasion or spreading, lead to inflammation of the larynx, the bronchial tubes, the lung substance, and the pleura.

Treatment.—Pure air, clothing, and a slightly laxative diet, to be given moist where there are any signs of sore throat or difficulty of swallowing. A cold will run its course, and the chief concern is to put the patient under favorable hygienic conditions. Only complications need treatment such as are now to be considered, whether they succeed upon a neglected cold, or arise from other special causes.

Nasal Catarrh (Chronic), Nasal Gleet.—A neglected cold, the breathing of impure air, or the injurious gases of chemical works, as a sequel to influenza, to strangles, and occasionally from the presence of parasites (pentastomes), as well as morbid growths, and injuries to the jaw and diseased teeth—from any of these causes a chronic discharge from one or both nostrils may be set up. The German term of " snotts " is very much used to describe it. It is chiefly a trouble of horses, but cattle are not immune, and sheep more often derive it from the long, flattened worms above referred to as pentastomes, or from sheep bots (æstrus ovi) which lodge in the chambers high up, and as wanderers are found in the brain, throat, and even more distant parts.

Horses are often affected in one nostril only, and more often the left than the right; this being the case also with glanders, which has led to mistakes. (See Glanders.) The discharge is irregular, both in consistence and the amount of accumulation, as well as the frequency with which it escapes, or is forcibly ejected. Gleets, whether of the nasal membranes, or the vaginal in mares and cows, are a cause of debility, and the subjects therefore generally thrive indifferently.

Treatment.—It should not be too easily taken for granted that the cause is in the membrane itself, as we have known an overgrown tooth to pierce the upper jaw, from which one has been removed, to cause gleet, as also abscesses in the hollow spaces of the face (facial sinuses), when a different course will have to be pursued if it is to be cured. If no polypus or other exciting cause exists, which can be removed by operation, the line of treatment adopted is syringing with astringents, such as the sulphates of iron, zinc, copper, the iodine combinations, as iodoform, and other astringents, styptics, and mild caustics. There is no one remedy better than

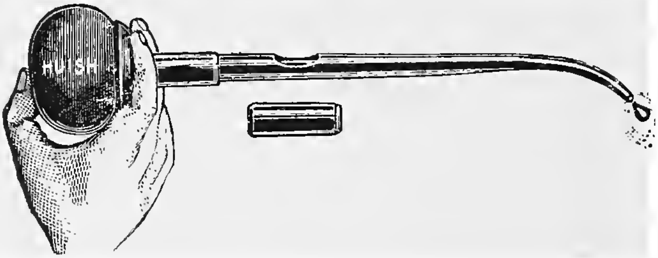

FIG. 11.—INSUFFLATOR.

another for all cases, as some respond to a single solution, others to a compound, and the writer recommends beginning with a four per cent. solution of burnt alum, and if this does not make a marked improvement, to use similar strengths of the other substances named, one after another, and finally all mixed but of the same proportional power. Iodoform is puffed up the nostril as a powder by means of an insufflator (Fig. 11), or in the absence of such instrument, a gardeners' puff bellows. Constitutional remedies are also advised, and these are of the same kind, iron, copper, and gentian being preferred, and of course a liberal diet, where a debilitating chronic malady has to be fought. (See Table of Doses.) In a dark and ill-ventilated stable a cure is extremely unlikely to take place, so sensitive is this membrane to evil smells and an atmosphere surcharged with ammoniacal vapor from urine and feces.

Bleeding from the Nose. Hemorrhage.—A discharge of blood from the nose may be due to slight congestion of the vessels of the expansive membrane covering the turbinated bones, from disturbed parasites while sneezing, or the inhalation of dust, or other irritating matters. A trickling of rather dark (venous) blood is then seen, or if a small artery has given way the blood will be bright red. It usually ceases without interference, but there are other cases of bleeding from the nose of a very serious kind, because indicating the rupture of a vessel of some size in the lungs. It is then a very bright red, and mixed with air bubbles and frothy mucus, distinguishing it from the kind of bleeding above mentioned. It probably comes in gushes, as blood does from a wound we can see, where an artery is divided. (See Hemorrhage, Bleeding, etc., at page 393, and Hemoptysis at page 180.)

Treatment.—Cold water thrown over the head and feet. A dose of gallic acid in solution, or of acetate of lead. Perfect repose. It may be advisable in some cases to plug the nostril, in order to give time for the formation of a clot. An alcoholic stimulant is required where the animal begins to sigh and sway, and threatens to swoon. Such treatment is commonly successful, unless the vessel is of such size and in such a position as to cause death from syncope. The after-consequences of hemorrhage into the lungs are quite as much to be feared, as the clot there formed becomes a focus of inflammation, and that of a septic kind too often, as it must be remembered that a wound in the lung is exposed to the air inspired, and if the latter is vitiated, so much the worse chance has the animal of recovery. A long time should elapse after an accident of this kind, before a horse is allowed to work, or a beast to be driven, or a dog allowed to gallop about or hunt.

Sore Throat.—See Inflammation of Throat, at page 83.

Diseases of the Larynx.—Laryngitis or inflammation of the Larynx, often called Sore Throat.

Not very frequent but of grave consequence. All species are liable to it, but it is of more importance in horses than other animals because of the dread sequelæ. It sometimes proves fatal in a short time. The principal causes are chills, influenza, strangles, glanders, purpura, and the lodgment of foreign bodies. The English thoroughbred is more prone to laryngitis than other breeds, but has not transmitted it to the American trotter, whose modern form and different gait make it difficult to believe that the original stock was chiefly drawn from the famous island breed.

Symptoms.—When it is the result of a cold (see Cold or Common Catarrh, pp. 159, 160), the malady invades the larynx slowly. When from more direct causes, the symptoms are acute and prominent at once. The ordinary febrile symptoms of dullness, loss of appetite, quickened pulse, and respiration, are followed by sore throat, or a painful and paroxysmal cough may be the first attractive symptom to any but the most watchful attendant. The cough is diagnostic, and quite different from a lung or bronchial sound. It is hard and coarse, and may be best described as an extremely painful one, the pain being evident to the novice even, and the patient can be seen to use every effort to avoid coughing. "Afraid to cough," as the stableman says. A fear and restlessness mark the animal's conduct. Sensibility to the touch, and the difficulty of swallowing is greater than in ordinary sore throat (which see at page 83). In seeking a position of ease, the patient extends the neck, and breathes in as straight a line as possible. A wheezing, hissing, or roaring sound is emitted, according to the severity of the attack, but there are intervals when the distress is less acute. The anxious expression of countenance, and turning of the head to window or door in quest of air, and the deep-red coloration of the membranes, show how imperfectly the blood is being aërated, and the sense of suffocation experienced. Temperament affects the conduct of the individual, and the high-bred and nervous stamp or scrape the ground with the fore feet, during the paroxysms of pain. The legs remain cold, while patches of sweat from time to time bedew the body.

Treatment.—With the most sensitive of all membranes upon the stretch, it is important that pure air, free from dust, or floating particles, should be procured for the patient. In town stables bedded with straw, the ammoniacal vapor is peculiarly aggravating, and as it may be impossible to remove the sufferer, we must do the best we can when we cannot "break out of the ring of circumstance." We may put down peat-moss litter, whose chief merit is the fixing of ammonia, or we may put a thin layer of chlorinated lime on the floor, the free chlorine combining with ammonia to form the harmless neutral salt (ammonium chloride), but great care must be exercised in not letting free chlorine reach the patient, or he will be made worse. It was to the presence of a large quantity of this chlorinated lime, that the author attributes the rescue of some seventy horses on a ship, when the ammonia apparatus burst and for a time the supply could not be cut off. In that case we scattered it in fine powder in the air, but for the purpose we are now considering it needs to be carefully spread under the litter. The bodily warmth must be conserved by clothing, and the legs bandaged. Only moist food offered, and the water should have the chill taken off, but not be warmer than the air, as horses will seldom drink tepid water. (See Sick Foods, at page 418.) Whatever views may be held as to the value of counter-irritants in other respiratory affections, their value cannot be questioned in laryngitis. Some may prefer the laborious and less effectual method of hot cloths wrung out in water as hot as the attendant's hands will bear, but the majority of experienced horse-doctors will prefer a strong liniment or a blister, which may add to the patient's distress for a very short time, but will create such a diversion and effusion into the tissues outside, as to soon reduce the pain and sense of suffocation within. A weak cantharides blister is preferred. The objection to ammonia liniment or to mustard, is in the irritating fumes which will be inhaled more or less, although the head may be held to an opening in the stable. A nose-bag, from which to inhale steam from a scalded bran mash is helpful, with some drops of camphor spirit added, or in bad air, eucalyptus oil may be used. Neither balls nor drenches should be given, but the chosen medicament administered in the form of an electuary. The most soothing preparation is one of extract of belladonna, 1 part, chlorate of potash, 1 part, nitrate of potash, ½ a part, honey, treacle, or glycerine, 4 parts. Of this, one or two teaspoonfuls should be smeared upon the tongue by means of a paper-knife or other smooth flat object, repeating the dose every four hours while the acute symptoms continue. Despite all treatment, there will be cases in which suffocation threatens, and it then becomes necessary to resort to tracheotomy. (See page 169.)

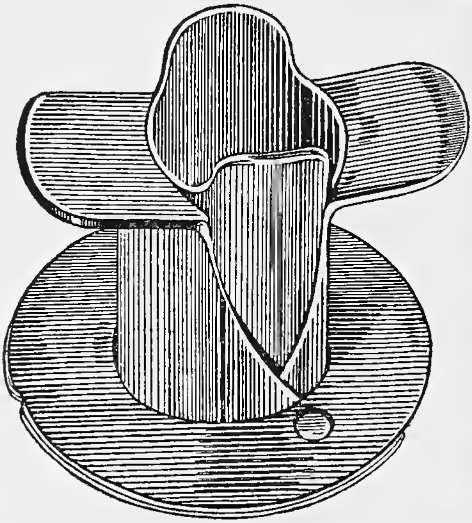

Fig. 12.—Tracheotomy Tube.

Instant relief is obtained by this operation. If the first stage of the disease can be weathered, the animal may be expected to recover. The next is the moist one, when he is troubled with mucus in excess, and a softer cough in getting rid of it. The owner's anxiety is now changed from a possible loss of the animal, to the possession of one whose value is seriously impaired by thick wind, whistling, or roaring. Our efforts must not be relaxed, but good nursing continued, and the patient's strength sustained by such easily assimilated foods as eggs and milk, and beef tea mixed with linseed and oatmeal gruel. It is thought that the changes of structure which lead to roaring may be controlled to some extent by giving iodide of potassium, in doses of half a dram daily, with mineral tonics, as iron and arsenic. The iron should be in the form of saccharated carbonate, one or two drams, and the arsenic as Fowler's solution, and half an ounce for an average horse. (See Table of Doses.) Blisters to the throat at intervals of a few weeks are regarded as helpful.

Roaring, Whistling, and Thick Wind.—The malady last considered (laryngitis) is perhaps more provocative of whistling or roaring than all the others combined, but there is an hereditary predisposition to "making a noise" in some families, and the defect develops in some English thoroughbreds without so much as a bad cold, or any known ailment preceding it. Ulceration of the larynx, paralysis of the dilator muscles, thickening of the membrane in any part, from the larynx to the bronchial tubes, may any or all of them give rise to wind defects variously described, but all having a chronic tendency to grow worse rather than better. In a work of this character, intended to suggest remedial measures for the diseases of animals, rather than to discuss pathological questions, it would be a waste of space to go into the controversies which have raged, and still do rage about the subject. The unhappy fact stares us in the face that it is incurable, although some palliation is possible, and to such points only will we direct attention.

Treatment.—When of recent occurrence, repeated mild blisters to the throat favor the absorption of exudates, and before they become organized and permanent. The administration of iodides internally has a similar effect. So far, we may consider the treatment as more or less curative, or calculated to minimize the tissue changes or nervous influences, which are responsible for the defect. In addition to these, we may adopt a regimen that will deter to some extent the further progress of the malady, and enable the whistler to do a good day's work. The drinking water should be soft, or distilled water if a condenser is handy; and it should be given always before, and not after food. All the food should be damped. It should consist only of the best cereals, mixed with sufficient chaff to ensure mastication and thorough insalivation. Heavy oats, well sifted, are to be preferred to maize, barley, or other grain, and in every feed a small portion either of crushed linseed or of linseed oil. The excitable hunter or chaser, with a disposition to looseness, will be given the crushed seed, and a draught horse with a tendency to constipation, will take the oil. Long stuff should only be given as an occasional treat, and then dipped in water, if the animal is beginning to tuck up, or fail to carry a belly, consistent with the best digestion and robust health. Roarers have their bad days and their good ones, and any slight cold prejudices their wind, hence it is important to treat a cold promptly. (See Common Cold or Catarrh at page 160.) Many experiments have been made with drugs, and there is no doubt as to the palliative effect of sedatives if judiciously employed. Of these, digitalis, opium, chloral, and belladonna, camphor and tar in various combinations, and given in the bolus form, take precedence, but arsenic, given continuously, has perhaps most effect. The " arsenic habit " can be established in horses as it is in the Tyrolese miners, whose extraordinary wind-power in the scaling of mountains is attributed to the use of the drug, but

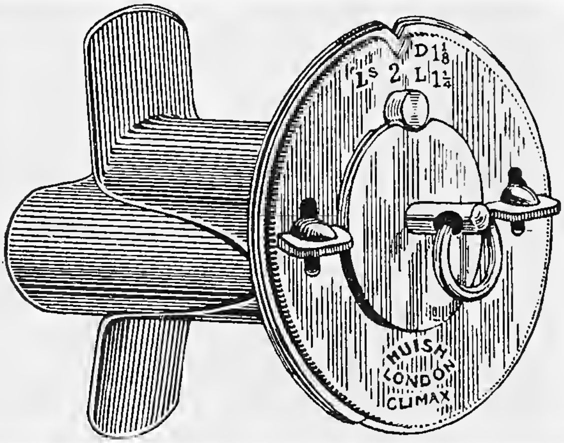

Fig. 12a.—Tracheotomy Tube.

quadrupeds, as well as bipeds, once addicted to it must continue its use, and even increase the dose gradually, in order to derive the full benefit. Commencing with three grains daily, and working up to ten, the subject will enjoy better wind-power and grow sleek in coat. To what extent the drug may be increased in case of necessity is not known, but, provided no very sudden and great change is made in the amount, no danger to the patient is entertained. There is an illegitimate use of arsenic known to many dealers in screws, who use it for conditioning (see Conditioning, at page 359), and such horses when they change hands, lose their bloom and rapidly fall away while no actual disease can be diagnosed.

It should be said that the noise made in inspiration by so-called roarers, distresses listeners more than the subjects of the malady; indeed it may be compared to snoring in bipeds, but many humane persons hearing a horse roar with a load behind him, cannot believe that the man in charge is not a brute, and the horse suffering much pain. This it is and not his inefficiency which usually makes an owner pass on the defective animal. Again, it is the onlooker's comments which influence the owner of the horse with a tube in his pipe, to let some one else have him. Provided the tracheotomy tube is cleansed and the orifice cared for antiseptically, a "tubed" animal is as good almost as a sound one, but the uninformed man in the street, and above all the woman who knows everything, except how to manage her household, will collect a little group of people to express their horror at the supposed cruelty inflicted on a "poor dumb beast," who is quite unconscious of any more inconvenience than the woman experiences from an ear pierced to accommodate a ring.

Removal of the arytenoid cartilage was practised in Europe for a time, but the last state of that horse was worse than the first; because the larynx fell in. The tube is the best thing for a very bad roarer. Tracheotomy is practised in emergencies, for animals threatened with suffocation, and the reader is invited to peruse the instructions given for its performance elsewhere.

An operation on the larynx has been recently revived in America, and copied in England, whereby the membrane of the so-called ventricles of the larynx is stripped, in order to cause adhesion of the vocal cords when the denuded surfaces make a new growth of tissue.

When this adhesion takes place, the obstruction to the ingress of air is pulled out of the way, and the animal is practically restored. The operation was practised by Gunther in Germany some seventy years ago but soon fell out of favor. There is no succinct account of it to be obtained, or why it ceased to be practised, but the presumption is that it did not succeed in a sufficient number of cases. There were as good anatomists and as skilful operators then as to-day, and but for the advance in aseptic surgery we are no better able to perform than were the Gunthers (father and son). We mention this because at the time of writing we have no reliable American statistics, nor has the revival been of sufficient duration in England to warrant any very definite conclusions as to the value of the operation. Several hundred cases have been recorded by Professor Hobday, who learned from an American Professor, but only about one-third could be said to be cures, and these had not been done long enough to judge of their permanency. We remember the same enthusiasm for the other operation referred to above, and its disastrous termination. The chief veterinary officer in the British Army took it up, and a large number of cavalry horses were operated on for the removal of the left arytenoid cartilage, which caused later the falling in of the roof of the larynx, and the subjects had to be destroyed as useless. Whatever future there may be for ventricle stripping, it will only be carried out by specially skilled surgeons, and on animals of great potential value if cured, as the expense entailed and the time needed is so considerable as to place the performance beyond the means of the ordinary owner of the work horse.

Thick wind is the defect which more often follows bronchitis, but may be caused by any roughened surface over which the air has to pass. (See Bronchitis, at page 173.)

What has been said of laryngitis, and of roaring, in the horse, applies to other animals, but the thickening of the wind, or making of abnormal sounds, is not of equal importance in animals not destined for the collar or the yoke, and only kept for milk or to be converted into human food.

Bronchitis (Chronic) in Dogs.—Most people nowadays know that every medical word ending in "itis" means "inflammation of." In the present instance, it is inflammation of the bronchi, or bronchial tubes, with which we have to deal. Occurring as a primary disease, it affects chiefly the larger tubes. When following upon respiratory disorders, the smaller ones may be chiefly affected. There is an acute, and a chronic form. If we make exception to the old and weak, whose predisposition to the chronic form is generally recognized, we may say that young horses brought for the first time into the polluted air of town stables, are the most frequent sufferers. Damp, unventilated stables, that never really dry even in summer-time, are specially prejudicial to the bronchial mucous membrane. Bronchitis often occurs at the same time as pneumonia, when it is known as broncho-pneumonia. The one may lead to the other, by a process previously alluded to as invasion, when speaking of sore throat and common cold. One attack predisposes to another. Each leaves the bronchial membrane more thickened. (See Thick Wind and Roaring, on page 167.)

Symptoms.—Those of a common cold more often than not, but there are notable exceptions. Following quickly on these, is the rattling noise which distinguishes bronchial troubles from other respiratory diseases. The breathing is faster, the pulse accelerated and the temperature raised. There is a languor and disinclination to movement and loss of appetite. The extremities are variable, sometimes one limb will be warm, and the others cold; a symptom common to bodily inflammations, and not by any means diagnostic. The peculiar rasping sound which may be often heard at a distance, is quite distinct from roaring, or the sounds emanating from a subject of laryngitis. It needs no gift of imagination to associate this rattling with a surface at first thickened by congestion of the membrane, and subsequently covered with a frothy or muco-purulent secretion. Confirmation is obtained by placing one's ear against the windpipe, and the sound may even be distinguished through the thick chest walls, both of the breast and behind the elbows. There is thirst at first, and a racking spasmodic cough at irregular intervals. It is loudest when the larger tubes are chiefly concerned, and partakes more of an ordinary chest or lung cough, when the smaller bronchi are inflamed. The acute, congestive stage, is the most painful, and is succeeded by a production of mucus which softens the character of the cough, and leads to the emission of mucus from the nostrils, and sometimes from the mouth. If the animal could but expectorate in the manner of his master, if he could manage his cough as we see some old persons do who suffer from chronic bronchitis and asthma, he would get rid of a lot of stuff that provokes an unnecessary repetition of the cough. We have known bronchitic old dogs to do this. They will lower their heads and bring the offending material into the throat, and then with a final effort that sounds something like an attempt to vomit, will bring the matter into their mouths, but with all their superior intelligence, they do not expectorate, although they may have had the advantage of living with a chewer of tobacco who has made a fine art of it. Dogs swallow the coughed-up material, and for this reason we make a difference in their treatment, by which they greatly benefit, namely, the administration of an emetic. It is quite surprising what an amount of tenacious mucus a bronchitic or asthmatic dog will vomit, and the result is agreeably surprising. The writer has been able to prolong the life, and add greatly to the comfort of wheezy old pets, as well as their mistresses, by periodical doses of apomorphine (one-eighth to one-quarter of a grain by the mouth, or half the quantity hypodermically injected).

Upon the viscidity or otherwise of the accumulated mucus depends the chance of recovery.

Treatment of horses, cattle, and sheep, swine, and other animals than the dog, consists in the administration of direct sedatives, bold anodynes, expectorants, and counter-irritation over the region affected, as well, of course, as suitable nursing, which includes pure air, clothing, and nutritious, succulent foods, such as have already been advised in laryngitis and sore throat. (See Sick Foods, at page 418). Opium, belladonna, chloral, camphor, and cannabis indicus are among the most powerful remedies to be given in the early and most painful stage, and acetate of ammonia, spirit of nitrous ether, sulphate of potash, ipecacuanha, iodide of potassium, squills and honey, as expectorants, which have the effect of thinning the secretion, and rendering it easier to bring up. Mustard-and-vinegar applied to the chest and sides, as well as down the course of the windpipe, affords relief after the first temporary distress caused by its action; a distress, by the way, that human subjects are quite willing to endure. Spirit of turpentine one part, and linseed oil two or three parts, answer well for cattle and sheep, with thick skin coverings of hair or wool. Turpentine must never be used for the favorite cat. When the throat seems to share the inflammatory action, the belladonna electuary recommended for laryngitis should be given, a preparation quite suitable for bronchitis, where any difficulty or risk is felt in giving fluids. Chlorodyne and paregoric are good pain allayers as well as expectorants, and it is well to make changes in the remedies if satisfactory progress is not made. The benzoic acid in that old-fashioned tincture known as paregoric elixir, has a very beneficial influence in loosening the phlegm. Nauseous remedies, as tar and camphor, may be given as balls, unless throat symptoms forbid this form of medication. (See Administration of Medicines, at page 424.)

Inhalation of steam, or more correctly the vapor of hot water, is of greater benefit in bronchitis than in any other chest affection. If no conveniences exist for the setting up of a bronchitis kettle, it may be that buckets of hot water are procurable at no great distance, and these may with advantage be made to stand in the stable. Steaming from a nose-bag should be carried on with care not to scald the delicate muzzle, nor to frighten the patient by admitting insufficient air. Upon a scalding bran mash, the addition of a teaspoonful of Friars' balsam at one time, and of spirit of camphor at another, will calm the cough and loosen the phlegm.

The laxative food prescribed, should prevent constipation, but any tendency to this state should be promptly corrected by linseed oil, or injections of soap and warm water, or the introduction of neat glycerine into the rectum, holding down the tail for a few minutes after passing it in. In the convalescent stage, when most sufferers from bronchitis remain depressed and languid, benefit will be derived from quinine, nux vomica, and infusion of gentian; the latter made fresh daily and at trifling cost is better for the purpose than the pharmacopœia concentrated preparations.

Chronic Bronchitis.—This is a sequel to the acute form we have been considering, and differs in the absence of febrile symptoms, and in its severity as well as permanence. Slight colds aggravate, as does any unusual labor or abnormal exertion or sudden climatic change. The smaller air tubes have their caliber diminished by the thickening process of the membrane, and the debility which accompanies the disease is partly due to the insufficient amount of pure air taken in through pipes of lessened capacity. The symptoms are those of acute bronchitis, merely modified. The cough is less frequent and distressing, except at periods, as above indicated. Dry or dusty food easily provokes coughing, and this may be said also of cold air, when the subjects of chronic bronchitis come out of the stable.

Treatment consists in those ameliorating influences mentioned in connection with roaring and thick wind (which see at page 167), but no cure can be expected.

Congestion of the Lungs.—When a person with a very bad chest cold, narrowly escapes inflammation of the lungs, his medical attendant often describes it as congestion, but that is not what is meant by the horse-doctor when he speaks of congestion of the lungs. It is generally known that all the blood in the body has to be sent through the lungs for renewal. A different set of vessels are employed for this purpose to those which supply the lung substance with nourishment, in the same way that all other organs receive their nutrition. Inflammation of the lungs is a condition affecting the lung tissue itself. Congestion of the lungs means stasis or blocking (congestion) of the vessels which convey the blood for contact with air, and to reoxygenate it. (See Inflammation of the Lungs, at page 177.)

Congestion, in the sense we have endeavored to describe, seldom occurs in animals not called upon for excessive exertion. Inflammation is a disease which may overtake individuals of any species. It should not be supposed from this that the standing cow and the fatting pig may not have congestion of the lungs from special causes, but that the sudden and often fatal arrest of the circulation in the pulmonary vessels, is mostly the result of over-exertion or of heart failure through want of high condition of heart and lungs. (See Conditioning, at page 359.)

The reader will perhaps better understand the meaning of congestion of the lungs, from a typical case such as occurs in the hunting-field, or to the pacer. The animal comes out of the stable in perfect health, but not trained, or in sufficient hard condition, as it is called. He is pressed, to the point of being blown, or pumped out, as we are when we pull up for want of wind. The horse does not stop until he is bidden, or he may be a high-spirited one who will "go till he drops," as the familiar phrase has it. A certain point is reached when the force of the heart's beat is inadequate to pump the blood through the vessels. This sensation we all know, and we stop and get our wind again. So will a horse, when ridden almost to a standstill, if his head is turned to the wind, his girths slackened and time given to recover. A good horseman feels, before he sees, that his mount is nearly done and dismounts before he notes the flapping nostrils and heaving flanks of the beaten beast. If, on the other hand, he rides the willing horse farther, congestion of the lungs is the result. The trapper does the same thing, only in his case the mistake is generally made of taking him into a stable when he might have been unhitched outside, and got a few deep draughts of pure air, which would have turned the scales in his favor. Horses gradually prepared or conditioned as racers and chasers are, can endure much exertion, because their heart and blood-vessels are tuned up like their muscles, but it is the fat, idle, or unconditioned, that chiefly suffer from congestion of the lungs.

Certain diseases, as influenza, strangles, catarrh, digestive disease, and specific maladies as glanders and purpura, lead to congestion, when it would seem to be rather a case of a heart failing to do its work through the debility of interference with its functions, induced by increased temperature and the effect upon the governing nerves of waste tissues in the blood. The congestion of the lungs in the case of fat stock, is clearly the effect of overloading the blood with rich substances, against which unnatural process outraged Nature rebels. To beginners, it may be explained that the capacity for putting on flesh, by assimilating excessive quantities of food, is an hereditary one, acquired through generations of selected animals who were found best able to bear it. We value horses with the deepest chest capacity and the hereditary quality of developing wind and muscle, and we value pigs for the largest flesh-forming capacity, and selection has done much to produce the varieties we desire. Those who die from congestion of the lungs when not excessively tried, are the unfit, and the breed is profited by their elimination.

Symptoms.—Blowing or rapid, shallow breathing, with dilated or flapping nostrils, distressful countenance, reddened eyes, the little vessels standing out in cords, and the membranes of the nostril sharing their appearance, quivering muscles, the body sweating and hot, the legs cold, probably the ears. There is a disposition to stand with the head in a corner, but some horses lie down, and finding it even more difficult to breathe when prone, do not remain long on the ground, unless so collapsed that they dread the effort needed to rise. It has often been said that horses do not go down in acute congestion, but the writer having seen a good many do so, records the fact here, although it does not help the novice to distinguish between the blowing induced by abdominal pain, and that which is so characteristic a symptom of congestion of the lungs. It is very much a matter of temperament; a heavy cart horse of lymphatic disposition will suffer the firing iron, with very little restraint, while a blood horse will be enraged by picking off a wart, and even these differ like men in their tempers. A dull stupor comes later, when want of oxidation of the blood has begun to tell on the brain. The heart sounds and pulse should be particularly noted, as these will distinguish blowing from chest trouble from the blowing of abdominal pain. In colic, the pulse is not affected much during the paroxysms, and not at all in the intervals. In congestion of the lungs there is at first a full pulse, in sympathy with the heart's desperate efforts to pump through the obstructing volume of blood, but later, the impact can scarcely be felt or counted, at, say, the angle of the jaw (submaxillary artery), but if the ear is placed against the ribs behind the elbow, the laboring heart will be very plainly heard. There is more to be ascertained by the ear against the chest walls; there is a crepitating sound, and instead of the ordinary respiratory murmur with which every horseman should acquaint himself, there will be a harsh bronchial noise. In the later stages, there will be areas of lung in which the absence of sound indicates complete blocking. Acute cases, such as we have described as due to overexertion in unfit condition, are more likely to recover than those of the passive kind induced by other maladies, and commonly following on enfeeblement by previous illness.

Treatment.—The object must be to give relief to the pulmonary vessels of the excess of blood, and strengthen the heart to do its work. If the horseman in the field has a spirit flask, he should give its contents; although it be a small dose, it is for a total abstainer who will derive benefit from his temperate habits. A gill of brandy or whisky may be given in a pint or more of water if obtainable, or an ounce of aromatic spirit (sal volatile) or two ounces of sweet spirit of nitre in a similar quantity of water. Half an ounce of carbonate of ammonia may be obtainable in a "dry" State and this can be dissolved in a pint of water and given as a drench.

We have said that at first the blood-vessels synchronize with the laboring heart, and at this stage we may bleed from the jugular vein with advantage, or give a stimulant first, and bleed when the heart has been roused to further effort. (See Bleeding, at page 375). There are doctors who differ from this plan, but our experience is very much in its favor, besides which, we think it must be easier for a tired heart to pump six gallons than it is to pump seven, or a tired man to carry six loads rather than seven. Every other means should be adopted to restore circulation, and equalize it by bringing blood to the surface by hot cloths, or mustard applied to the sides of the chest, by pulling the ears and bandaging the legs, hooding the head and neck, and clothing the body. Doses of alcohol during the first day may be assisted in their action by digitalis, which increases the heart's force but not its frequency, and has been called a heart tonic. It is not, however, a tonic in the sense of being available over any length of time, but may be employed with advantage together with the popular forms of alcohol. Pure air, a comfortable bed, a dose or two of linseed oil, if the bowels show a tendency to constipation, and careful nursing (see Sick Foods, at page 418), are the chief considerations with a horse recovering from congestion of the lungs. A considerable holiday should be given to afford the absorbents time to clear up the damaged material.

Inflammation of the Lungs.—This subject should be read together with the previous remarks on congestion of the lungs, in order to appreciate the distinction.

It is not engorgement of the pulmonary vessels, but inflammation of the lung substance, or parenchyma. All animals are liable to it. The causes are the same as induce other respiratory troubles. (See Catarrh or Common Cold, at pages 159, 160.)

Symptoms.—These are not usually so acute, nor so suddenly evident as in pulmonary congestion, but advance from a bad cold to a chest cold, and cause greater distress and more illness, as that word is generally used and meaning something more serious than being unwell or sick. The breathing is faster and the membranes discolored, not with a purplish or bluish hue, as in congestion, but with a rusty, red tinge, and a small and irritable pulse, quick, that is to say, but without force. There is none of the pounding away of the heart to be heard at the side of the ribs, when that organ is trying desperately to overcome congestion. The surface chilliness is not of that death-like kind observed in congestion, neither is there sweating and trembling save in very rare cases, of a very acute order. In other respects, inflammation of the lungs has many symptoms in common with chest disorders already mentioned. High-colored urine, constipation, and loss of appetite, are more pronounced than cough, which differs in character from that of pleurisy, in being soft and low, and from bronchitis in not having a rasping or rough sound in the passages; and from sore throat, or the cough of catarrh, in not being accompanied by a nasal discharge of any volume, and none at all during the first stage. What there is, is thin and frothy, the breath smells offensive, and indeed suggestive of decomposition in the lungs, and the discharge becomes a dirty red. The latter is generally a fatal sign; the discoloration being caused by broken-up blood cells and lung tissue. Listening to the sides, one may hear, in the first stage, sounds that are harsher and louder than the normal; in the next stage, when frothy mucus is present, crepitation, or crackling sounds, as of air and mucus being drawn through the cells and smaller tubes. The crepitation is quite different from that heard in the early period of pleurisy, the latter resembling the rasping of sheets of paper together. The products of inflammation presently block up the air-cells, and an area of dullness or complete absence of sound enables one to map out the ineffective lung. This loss causes an exaggerated sound in the upper part, and in the bronchial tubes, but long before this is noted, the case will have been diagnosed by the intelligent owner and been put under treatment. The train of symptoms above described apply to all species of domesticated animals, their behavior differing only as their habits do in health; the pig hides himself and doesn't respond to his dinner, and the sporting dog creeps away where he can be quiet, and, though he may not care for food, will prick up his ears when he hears the word " rats," or the click of a trigger. Instinct and habit have to be allowed for.

Treatment.—More reliance is to be placed on good nursing than on medical treatment. Neither should we treat the full-blooded young horse, fresh from lush meadows, in the same way as the galled and wearied jade in the poor man's city stable. We may bleed the former from the jugular vein, to his benefit, but we should kill the worn worker by abstracting blood to any extent. Counter-irritation to the chest walls, as for congestion and pleurisy, is advised. Hood, bandages and clothing, to keep up surface warmth, but above all we must have clean air. If some septic organism has not originated the trouble, it will certainly be hovering like a vulture to drop on the suffering member, and this is the cause of so many fatal cases, especially on board ship, where the air cannot be changed for all the electric fans, and scoops, and windsails that the engineers may provide. Bland, mucilaginous foods (see Sick Foods, at page 418), and an unlimited amount of pure drinking water should be supplied. If there is a distressful cough, an electuary may be used (see Dose Tables, page 442); otherwise, doses of acetate of ammonia, chlorate, nitrate and bicarbonate of potash may be given, and some sulphate of magnesia, or linseed oil, to counteract constipation. Alcoholic stimulants and quinine are given when the fetid breath is a pronounced symptom. If spirit is desired, an ounce of rectified spirit of wine should be mixed with the drinking water, as very few animals suffering from pneumonia are in a condition to be forcibly drenched. Horses are liable to vertigo, and to fall over backwards, cattle to get the draught the wrong way, and pigs to suffocation. The tractable dog may be drenched. (See Administration of Medicines, at page 424.) Convalescents seem to profit greatly by the mineral acids, and gentian, either as tincture, infusion or powder. (See Table of Doses, at page 432.)

Bleeding from the Lungs—Hemoptysis.—Except from external violence, bleeding from the lungs is rare in animals, but there are a greater number of cases than formerly among the early maturity breeds of cattle, and still more among pigs, whose dentition has been antedated, by selection of those which grow fastest, and whose blood-vessels can scarcely develop synchronously with the other tissues. Rupture of blood-vessels in the lungs is quickly followed by discharge through the nostrils, but some will come by the mouth. It is accompanied by bursts of coughing—a choking cough—in which fear and excitement is evident in the most phlegmatic. The blood is, as it were, whipped into foam as it comes from the nose, and with saliva and big bubbles as it flows from the mouth. Some amount of blocking of the bronchial tubes leads the poor beast to shake his head, and paw the ground, while he struggles for breath. A fatal issue is sometimes seen on the race-course, when a large vessel has given way, and the animal quickly dies of suffocation and syncope. The slight cases occur through lesions in the lungs, such as are produced during pneumonia, and the quantities of blood are small, and appear chiefly in the brick-colored discharge alluded to in connection with that malady.

Treatment.—A cold douche to the face, ice to the poll, perfect quiet in a cool stable with good air. The active principle of ergot (ergotin) hypodermically injected, may help to constringe the vessels, but this will not often be obtainable away from big cities. A diversion should be made to the bowels, by giving sulphate of magnesia, but force should not be employed, as it will lead to excitement, and better no medicine at all than that.

Asthma.—This lung trouble appears to be of the nervous order, and is marked by paroxysms of difficult breathing, and much distress, which is attributed to spasmodic contraction of the bronchial tubes which would account for the peculiar wheezing sound. It is not to be confused with broken wind. (See Broken Wind, at page 181.)

The causes are obscure, and have been attributed to both the digestive system and the respiratory, because it is known to follow on disorders of both, bronchitis in particular, and from the breathing of irritating gases and bad air.

Symptoms.—The attacks are sudden, and of uncertain duration. The jerking action of the body occurs during expiration. Inspiration is less difficult. It is distinguished from broken wind by the sudden and more acute nature of the attacks, the anxious countenance, and irritable cough which threatens to choke the animal. There is mucus coughed up or discharged from the nostrils, a symptom that is absent in broken wind, besides which, it passes off quite suddenly in most cases. In others, it develops by repeated attacks into a condition more nearly resembling that disorder. Horses, old cows, and broken-mouthed ewes, and dogs of the petted kind, are the chief subjects of it. It is comparatively rare in the young.

Treatment.—Whether or not asthma is a purely nervous disease, we know that direct sedatives are the best remedies. A mixture of chloral and the bromides, camphor, chlorodyne, belladonna, and valerian, generally give early relief. They seem to act the better for combination with alcoholic stimulants, of which the spirit of nitrous ether (sweet spirit of nitre) is the best. An oily aperient should be given, dry food withheld, and any that is bulky or innutritious, in order to give the largest amount of chest room. The owner soon learns whether the animal is one of those that do best in a moist or a dry atmosphere, for a peculiar feature of asthma, both in man and beast, is that the very opposite conditions are found to agree best with individual sufferers. We cannot dry the air very well, but we can introduce steam, or the vapor of hot water to a patient who will benefit by it. A carefully regulated dietary, and the addition of linseed, an avoidance of excessive exertion, and protection from extremes of temperature, will do much to maintain a fair measure of comfort in the subject of asthma.

Broken Wind, Emphysema of the Lungs.—It was formerly taken for granted, that the second name given above represented the pathological condition in broken wind, but the examination of a great many subjects after death alters one's views, if it affords no enlightenment. It is difficult in the most pronounced cases, to find any of the air-cells ruptured into one another, and the condition may be more correctly described as permanently dilated, or strained. Like asthma, already considered, it would seem to be a nervous affection primarily, and in some way connected with the great pneumogastric trunk, which supplies the vital organs. We associate the disease with horses having gross appetites, who distend themselves with food of a bulky and innutritious kind, and we find it most often among farm-horses where damaged forage must somehow be disposed of, as it is not good enough to sell. After wet hay harvests, when moldy stuff is fed to these animals, the foundations of broken wind are laid, if not at first detected. Whatever may be the exact pathology of this malady, all are agreed that dietetic causes are the chief, though not the only ones. There are hereditary cases, where the feeding has not been provocative, and others, in which overstrain of the lungs, while fat or out of health would seem to have brought it on.

Symptoms.—The peculiar cough is quite distinct from any other. It is deep and prolonged, the very antithesis of the short painful cough of pleurisy. In a well-marked case, the double effort in expiration is seen in the flanks, but in one of recent or less severe nature, the movement along the sides may be mistaken for the quick and shallow breathing of pleurisy, after water has accumulated in the chest, but there will be the characteristic cough, to prevent mistake. When standing in the stable, no cough may be heard, but it comes on after drinking or feeding. One of the earliest symptoms is a cough or two when commencing to eat, and is suggestive to the onlooker of dust in the forage, or some tickling from a particle in the throat. The ear pressed against the upper half of the chest will detect exaggerated sounds, as compared with a normal animal's. Some crepitus, or slight crackling will be heard, as of air passing in and out of the lung cells: not the ordinary "to and fro" sound, with which the doctor should be familiar.

With the progress of the disease, the walls of the chest grow rounder, the ribs being forced outwards, and as the animal coughs, it frequently breaks wind, *per rectum.* The working powers are diminished, and distress is exhibited with but little exertion. With enlargement of the belly, there is loss of muscle over the loins.

Treatment.—The secret of getting work out of a broken-winded horse consists in dieting. Such an animal is absolutely useless to one man, and a valuable servant to another. Good food, in the smallest bulk, and that damped. A portion of linseed in every feed, or linseed tea (see Sick Foods, at page 418) poured over carefully-sifted corn, and just enough chaff to ensure slow mastication, and insalivation. Watering before feeding, and never working within two hours of watering or feeding, never starting at the best pace, but commencing slowly to "open the pipes," and taking hills steadily.

With these precautions, many a broken-winded horse does more work than a sound one, but in the hands of a man who stuffs him with straw, and hay, and the refuse of the farm, he will have but a short period in which he is of any use at all. This disease, being as we have said, a nervous one, there are periods of exacerbation and of remission, and some palliatory medicines are desirable to have by one, for emergencies. Balls made of camphor, belladonna, emetic tartar, nitre and Stockholm tar, with linseed, have a very beneficial effect. All kinds of fat favor the suppression of the cough, and difficulty of expiration. Suet is often used; lard, linseed oil and vaseline, are made into balls. The sedatives advised for asthma may be resorted to at times with advantage. The mineral acids, and gentian, are also helpful for a change. When a stale old case no longer responds to such remedies as have been mentioned, we may resort to arsenic, but having once done so must continue to use it for the rest of the animal's life, as he will rapidly fall out of condition if deprived of the drug, when the arsenic habit has been established. (See Table of Doses, at page 432.)

Pleurisy, Pleuritis.—The lungs are covered and the chest is lined with serous membranes called pleuræ. When these are inflamed, the disease is known as pleurisy or pleuritis. As a distinct malady, it is often met with, also with pneumonia (Pleuro-Pneumonia). One side only may be involved, or both.

The causes are sudden chills and exposure to biting winds, when heated by exercise, or in horses when recently clipped, and made to stand still at street corners, or other exposed situations. Cattle standing in draughty buildings, or turned out in treacherous east winds in spring, and especially those who have wintered badly, are liable to pleurisy. Sheep suffer too, but their more hardy manner of life gives them some amount of immunity, as compared with horses and cattle. Pigs are specially prone to pleurisy, both as a result of climatic conditions, and, the writer cannot help thinking, as a feature of rheumatism, to which they are so liable.

Pleurisy also follows on influenza, strangles, and blood poisoning, and may be secondary to tubercular deposits in cattle and pigs.

Symptoms.—The shivering fits or rigors are generally well marked, more so perhaps than in other chest inflammations, as the strained membranes are very painful, and considerable shock is felt in acute cases. This remark applies more particularly to horses and dogs: less to cattle and sheep, and still less to pigs, which are often found to have pleuritic lesions after death, although no marked illness has been observed, and they have gone fat to the butcher. We would therefore make a distinction which does not appear in other works the author has read, and denominate one—the more commonly known one—as acute, and the other as sub-acute.

Newspaper readers will have noticed how many coroner's inquests are held upon persons who have pursued their usual avocations close up to the time of death, and not complained of any severe pain, while the post-mortem examination has shown active inflammation and old adhesions, proving previous attacks.

A typical case in the horse may be described, because we can listen to his chest sounds, and take better observation than with a pig in a sty, and among a number of others, but the general signs are the same with all quadrupeds. First the rigor or shivering fit, the staring coat, and increased temperature, then the quick, short, catchy breathing, which speaks so plainly to the animal lover, of a painful stitch in the side when a deep breath is attempted. After a few efforts to breathe in the ordinary way, the animal desists, on account of the pain, and takes shallow inspirations which scarcely serve to keep him going, and he makes another attempt, and suddenly abandons it with a groan. If made to turn he groans, and will probably do so if one's knuckles are pressed to his side. There is a special diagnostic symptom of pleurisy in the manner of expiration. From along the margin of the ribs, extending from the brisket to the flank, there is a distinct ridge which expands and contracts. It is quite different from the double flank movement of broken wind. (See Broken Wind and compare pp. 181, 182.) It gives the appearance too, of the belly or flank being drawn up, a symptom even more pronounced when the chest is filling with fluid.

Considerable friction between the pleural membranes will be heard on placing the ear against the sides of the ribs. It is a rasping sound, such as might be produced by rubbing two pieces of glass paper together. It differs from the more concentrated sounds in bronchitis, and is spread over a larger area, and not heard in front, when the ear is applied to the wind-pipe. The sounds in pneumonia are softer and more frothy, or like escaping air bubbles. (See Inflammation of the Lungs, at pp. 177, 178, and compare.) As the malady progresses, the friction-sounds change, the membranes producing a quantity of fluid, which falls to the bottom of the chest and is known as water on the chest, or chest founder, or hydrothorax. Auscultation enables us to ascertain this. We may hear sounds as of water dripping into a well, or tinkling of sheep-bells at a distance, and splashing noises which may be compared to pebbles falling into a pool. These sounds are also heard very plainly in greyhounds, and in thin dogs of the terrier class, which one may hold to the ear. One cannot make them out in a sheep, and they are not so easily discernible in a fat beast, but the wrinkling or drawing up of the flank, as above said, is absolutely diagnostic. The fluid accumulates to such an extent, that the animal cannot live unless it is withdrawn by a trocar and cannula, an operation rarely attended with lasting benefit. Favorable cases terminate by absorption of the water, before any great quantity has been secreted, or by the advent of lymph bands, which attach the lungs to the chest wall, forming permanent adhesions into which the watery fluid is partly incorporated, while the remainder is gradually carried away by the absorbents. There is a tendency to recurrence in the subjects of these adhesions, and for a time they restrain the movements of the lungs, and are felt when the animal exerts himself more than usual. He is also sooner "out of breath," as human subjects describe it, or pulled up by a stitch in the side. In the beginning, there is a hard and frequent pulse, but this slows down, and regains some of its power when the congestive or dry period has passed.

Treatment.—Of all pulmonary troubles this is the one most quickly benefited by counter-irritation. The seat of the trouble is not too distant to feel the full force of an opposite appeal to the circulation, and one may often see within an hour a very marked sense of relief from the application of mustard and vinegar to the sides, or a strong ammoniacal liniment. Bleeding from the jugular vein lowers the tension, and should be resorted to in any but poor and weak subjects. A cool, pure atmosphere, a well-bedded, roomy box, clothing to keep up surface warmth, and hood and bandages for the extremities.

Diet as advised in catarrh and pneumonia (which see, pp. 177, 178). The medicines most likely to help, are such as first steady the heart, and for this purpose, alternate doses of aconite and belladonna have the best repute. Then salicylate of soda, for reducing temperature; this drug being of special value in what I have called the sub-acute or rheumatic form, in pigs. The sulphates of magnesia, and soda, acetate of ammonia, and nitrate of potash, have an influence upon the blood, and secretions, which is beneficial, and tend to prevent constipation.

Cough.—Many references have been made to coughing as a symptom of pulmonary diseases, and it is important that the animal doctor should cultivate a knowledge of these sounds, as a musician does those of a more pleasing kind. The student should learn the harmonious ones, by frequently listening to the chest of animals in health, and noting the peculiar characteristics of each chest trouble. Instead of confusion as to what is the matter, or which malady the patient is suffering from, he will often diagnose the case before he enters the stable. This should not lead him to what is professionally known as " the lightning diagnosis " by which some doctors seek to shine. He should use all the means at his disposal to make as complete a mental map of the inflamed area as possible. It may be well again to recall typical coughs: the loud painful cough of laryngitis, which shakes the animal, and makes him fear to repeat it, the soft deep-down cough of pneumonia, the sharp, hard cough of pleurisy, with the set ribs that forbid the act, together with the tucking up of the flank, or formation of a ridge, and the long-drawn cough of broken wind. Between these are many gradations, but there will always be other symptoms, which will enable the observant person to form a fair judgment, if he will take occasion to note the types of cough just enumerated.

High Blowing.—Disputes as to the soundness of a horse's wind have often arisen through this peculiarity. Some few individuals have a habit of making this sound, with the aid of what are called the false nostrils. They are generally very thin-skinned ones, with flexible alæ, and they seem to find amusement in it, when first put to the gallop, but it goes off when they extend themselves for serious work. It is not like whistling, or roaring, to one who has heard it, but does not lend itself to description. It must be heard to be understood. There is, however, the simplest and most effectual of tests available to all, namely, the continued galloping of a suspect until he ceases to do it. A real whistler or roarer will of course make more and more noise when pushed in his paces. High blowers may almost be said to be the best in wind.

CHAPTER VII

CONSTITUTIONAL DISEASES

It has been stated at the beginning of this book, that any classification of disease must be more or less arbitrary, and never wholly satisfactory. We are confronted with the difficulty here, as some authors place diseases under the list of specific, which others call constitutional, and the only way for the reader is to look in the index for anything he does not readily find. More than one name is given in many cases, and if the student does not find a subject under some term which is a provincialism, he is asked to look under others, as we have endeavored to make a fairly full index in which synonymous terms will be found.

Rheumatism.—What is it? The text-books say, "it is a specific constitutional disease, sometimes assuming an acute febrile character." (Professor Axe.) "It is marked by local manifestations of pain of varying intensity, with a tendency to shift from place to place, and to recur periodically." This sums it up very well as far as horses are concerned, but it doesn't account for pigs with all sorts of lesions, which are disproved to be tuberculous, and from which the animals do not appear to have suffered during life, unless the joints have been involved. It is not like the crickles or crockles of cattle, to which we will presently refer. The above definition is rather an outline of general symptoms, than an explanation of what rheumatism really is, or what is the true cause. The rather long list of causes generally enumerated, does not include some defect in metabolism: some catabolic failure by which the decomposing elements of cells, the worn-out tissues, continue in the blood, and have a special influence upon serous surfaces, and more particularly on synovial ones, as found in joints. This effete material is usually eliminated by the kidneys. In the human subjects of rheumatic fever, the skin gives off sour exhalations, only too much like urine being excreted by the skin, vicariously. With the passing of a lot of strongly-colored urine, with urea but barely held in solution, comes relief. With purging and the introduction into the blood of solvents of urea, there is abatement of the symptoms. Blisters "draw out the rheumatic poison," it used to be said by observant if not highly scientific practitioners. The present writer agrees with their practice, and assigns to it an unseen principle (so far as they were concerned), but to his mind proved by the uses of salicine and other eliminants. No book would be complete which did not repeat the long list of causes of rheumatism, but it would be more correct to say that they are contributory, rather than causal. For instance, "exposure to weather" comes first, but what practical stockman does not know that the colt, out in all the winter storms, escapes rheumatism, when the coddled old favorite gets it in the stable! It isn't the steers who have to scrape away the snow to find sustenance that are crippled with rheumatism, but the family cow, sheltered from the inclemency of the weather.

Causes.—Cold, damp, bad ventilation, damaged fodder, east winds, exposure, sudden changes of temperature from the warm stable to the cold hillside. Very likely these things favor rheumatism, because they check excretion, but the animal most prone to rheumatism is the dog enjoying all the comforts of his owner's home.

Cripples, or crockles in cattle, is said to be rheumatic in origin, and occurs most often on undrained, mossy, and sour land. The sufferer arches the back, and takes very short steps, walks as if on stilts, falls off in flesh, is hidebound, and if a milk cow, soon dries.

Change of pasture, and ounce doses of turpentine spirit, in half pints of linseed oil, have given good results, and may be recommended, without waiting for the discovery of the true pathology of this ailment. Dogs suffer from rheumatic fever, and are pitiable to behold. The valves of the heart are afterwards thickened and they are liable to die suddenly, as with human patients similarly afflicted. That a man should die of heart-disease after three attacks of rheumatic fever used to be considered a necessary sequel, but now, since the use of salicine and its combinations, a complete recovery is looked for in both man and beast. This drug keeps the fibrin in solution, which used to be arrested on the mitral valves, and render them imperfect.

Rheumatism may be local or general. The most common forms in animals are those affecting the voluntary muscles and the joints, and the stiffness, tenderness, and behavior of the subject renders diagnosis easy. The puzzling cases are those in which there is sudden transference from one joint to another, and from one limb to another. We have known three doctors to make each a different diagnosis as to the joint affected. They were all of them right, because on every occasion that they separately examined the animal, the malady had shifted. More often it is to be found in a lame limb, a swollen and shiny joint, tender to the touch: or if affecting the loin, the patient moves with difficulty and all in one piece, so to speak, turns very awkwardly, and with much pain. When rheumatism can be thus located, external applications are beneficial. For the inflamed joints of horses, blisters of cantharides, or ammoniacal liniments, such as hartshorn and oil, or compound camphor liniment. Weak biniodide blisters, one in 12 or 14, may be used. In the experience of the writer, all animals benefit by a purgative when first attacked by rheumatism. The horse should have a ball, containing about half as much aloes as would constitute a full dose of "physic." The dog will take from 50 to 150 grains of aloes as a ball. Cattle, from four to eight drams, with a quarter pound each of sulphate of soda and magnesia (Glauber's and Epsom salts): after which salicylates of sodium can be poured into them twice or three times a day, with good prospects of success. (See Table of Doses, at page 432.)

Dry housing, good bedding, clear drains, and avoidance of damp and draught, will favor recovery from rheumatism, as from most other diseases. (See Sick Foods, at page 418) (Administration of Medicines, at pages 424, 425.)

Lymphangitis, Weed.—(See Diseases of the Blood, at page 30.)

Purpura Hemorrhagica.—(See Diseases of the Blood, at page 17.)

Hemoglobinuria.—(See Diseases of the Blood, at page 20.)

These and other diseases sometimes classed as constitutional will be found in other sections on reference to index.

Infectious and Contagious Diseases.—A distinction was formerly made between diseases carried by unseen agencies, and called infectious, and others which were induced by contact, as when specific germs are purposely or accidentally introduced. This distinction is done away with, now that causal organisms have been found for most diseases, and are believed to exist in the remainder. "Infectious" is the term now employed. The infectious diseases of animals are for the most part dealt with under the heading of specific diseases, where will be found glanders, cattle plague, foot and mouth disease, swine fever, influenza, rabies, and other maladies, commonly known as infectious or contagious.

Some of the rarer diseases have not been mentioned and may be briefly noticed here, as Dourine, or Maladie du Coit.

Dourine.—This contagious disease is communicated by the virus coming in contact with an abraded surface. It is conveyed during the act of copulation, hence the French name given above. A virulent form of this disease occurs from time to time on the continent of Europe, but the British Islands have hitherto escaped it. A similar trouble has been described in the Southern States, but by non-professional observers, and it is doubtful if the true dourine has ever occurred in the United States. A trypanosoma (equipedum) is the actual cause, and its flagellum favors its conveyance in the fluids of the genital membranes and mucus secretions. So far as is known, this is the only trypanosoma that is not conveyed by a biting insect. (Sleeping Sickness, Red Water, Malarial Fever, etc.)

The importance of this subject to American readers consists in the danger of importing the infection in the Percheron and other European stallions with which the lighter breeds are largely built up for heavy draught work. The period of incubation varies from eight to twenty-eight days, so that an infected sire might easily pass the vets at the Customs, and once past the barriers, it is impossible to estimate the mischief that might be done. A discharge makes its appearance in male or female, and red spots or vesicles come up and break, leaving ulcers. This malady has been compared by Bouley and Trasbot, and other eminent French veterinarians, to syphilis in the human subject; the chancres above described as ulcers would favor the notion, but Axe and other more recent investigators do not regard it as identical. Death occurs in seventy or eighty per cent. of horses attacked, after a long illness, with many signs of blood-poisoning; paralysis and emaciation ushering in the end.

South African Horse Sickness.—Horse death, perreziekte, pardenziekte, and many other names, have been given to an equine disease which proves fatal to ninety per cent. of horses attacked, and leaves a "salted" one very valuable. Investigations in German West Africa and in the British colonies have led to conflicting accounts of the disease, the former regarding it as a form of anthrax, and the latter as septicemia, induced by the bite of some nocturnal insect. Both Macfadyean of England, and Nocard of France, took the latter view, which is more consistent with a ten per cent. scale of recoveries, than if anthrax was the cause. This is another evil which America has hitherto escaped, but with her vast territory, and equine population, it behooves her to maintain in full force the excellent quarantine regulations, against which, of course, impatient importers are heard to protest, from time to time.

Epizootic Lymphangitis.—Another of the plagues the British troops brought back with them from South Africa, is distinguished by the above name. It is seen in the lymphatics of the skin and is caused by an organism—a cryptococcus, which gets into the tissues through wounds or abrasions, such as fetlock brushes, or bridle scrases, and the importance of the disease consists in its easy transmission, and the incapacitation of the animal from work, owing to superficial sores, and not to any serious illness. The disease was at first confused with farcy, but unlike that malady (see Farcy and Glanders, at page 27), does not excite internal troubles and specific lesions anywhere but on the skin. It has one resemblance to farcy, in the uncertainty of the period of incubation, which may vary from five or six weeks to four or five months.

Treatment.—The intractability of the malady need not deter one from treatment, which must eventually succeed, but the stamping out system is the only satisfactory one.

CHAPTER VIII

DISEASES OF THE MALE ORGANS OF REPRODUCTION

Phymosis, or Enclosure of the Penis.—Inability to extrude the penis is an inconvenience, and likely source of trouble to the animal merely intended for slaughter as food, but to the beast retained for stud purposes it is fatal to his utility unless cured. All the domesticated animals are liable to it. It may be overlooked in the early period of the life of the calf, pig, lamb and puppy, as they do not extrude the organ until the period of puberty is approaching, but the foal must needs put out his yard in order to urinate properly. This the new-born foal is sometimes prevented from doing by the penis being simply folded back within the sheath. He is seen to be uneasy, stands awkwardly and tries to pass water and perhaps dribbles some, but closer examination will show the sheath to be bulging and enlarged. If the state of affairs is not so early recognized, he will very likely show griping pains (see Gripes, at page 100), and be found on his side and looking very miserable as the bladder fills and he gets no relief to the painful and distended condition.

Treatment is very simple. We have only to secure him and with a greased finger release the organ: applying a little vaseline to lubricate the passage. Congenital deformity by which an inadequate opening is provided, is rare indeed in equines but not infrequent in ruminants, in pigs, and in dogs. Phymosis in the adult horse occurs as the result of external violence incurred in jumping, by kicks and blows, from the presence of warts, tumors, venereal diseases (see Dourine, at page 191), and as a sequel to castration. Such special causes will call for treatment according to circumstances. (See Wounds, Castration, Warts, etc.)

The congenital deformity is generally capable of relief by enlargement of the orifice and this must not be attempted by the futile plan we have seen recommended and practised in some cases, namely, the slitting open of the narrow circular orifice. This practice gives only temporary relief. When the wound heals, the opening is smaller than before, and the cicatricial tissue makes it more difficult than ever to extrude the penis. The apparently unscientific plan of snipping off the end of the sheath, is the most effective means, and the prolongation of the soreness is rather to be desired, as it prevents contraction, and meantime the animal acquires the habit of putting out the yard; this also tending to prevent constriction of the orifice.

An inability to put out the penis often happens to aged geldings through the swelling of the sheath (edema) and the accumulation of so-called cod-wax. The abnormal consistence of this dirty and ill-smelling material may be the cause of the edema in the first instance, or a debilitated state of the animal may first lead to swelled sheath and then to the retention of the penis.

The entire horse is provided with a secretion of an unctuous character which keeps the penis lubricated, and facilitates copulation. Its natural exercise promotes a healthy secretion. The gelding's penis makes very little growth from the time of deprivation of the testicles: the sebaceous glands secrete an imperfect product which in the aged has a tendency to become glutinous and waxy, and even purulent, from long detention within the cavity. This, then, is the material vulgarly called cod-wax and needing removal in every case where it is seen to accumulate in large flakes upon the extruded organ during micturition. The retention or phymosis is then speedily relieved. (See Edema of the Sheath, at page 196.)

Phimosis is generally understood to mean what we have already described, but owners of young bulls, of rams, and of boars, are frequently troubled by having animals that seem willing to serve but unable. They leap, and extrude the penis a few inches, or perhaps just show the end of the organ and then drop off as if hurt. This calls for investigation. The animal should be cast, secured, if necessary, chloroformed (see Anesthesia, at page 390), and an exploration of the sheath should be made, a plain, smooth celluloid probe being passed around the penis to discover any adhesions, or growths, or other possible obstructions. Sometimes a wart or a foreign body is lodged there and can be removed. In the case of a bull coming under the notice of the writer, a piece of string had twice knotted itself round the penis. No other means could be accounted for this accident, except the indrawing of the string upon the bull's yard while he was lying down. Soft granulations or spongy warts have been the cause in others, while a congenital deformity has accounted for still other cases; the penis in these having an unnatural adhesion to the sheath. This may have resulted from inflammation following on a kick, or a blow in jumping a fence. The withdrawal of the yard may be more easily effected by dipping the hand in some meal before grasping it. (See Cancer of the Penis and Warts, pages 197, 270.)

Paraphimosis, or Inability to Intake the Penis.—Some of the causes which give rise to paraphimosis are the same as those mentioned in connection with the opposite trouble. When the penis swells greatly outside it cannot be retracted. Paralysis is caused by morbid growths upon or within the organ, or in the sheath, injuries, stones in the canal, and inflammation due to sexual relations. The symptoms need no description. The organ often attains to an enormous size when long extruded. Red and painful at first, it soon grows purple and black and becomes cold and less sensitive to the touch. From this stage, mortification soon follows if relief is not obtained. In the paralysis of old age, the hanging penis is not so extremely large, and there is an absence of pain. In the ordinary form of the disease, there is much pain, and the animal wears a haggard expression, is restless, and soon loses flesh.

Treatment will necessarily vary according to the cause. For debility, good feeding and tonics will be prescribed, but in the acute cases we must endeavor to return the organ mechanically; first by warm fomentations, then by employing olive oil or vaseline, and gentle force with the hands. The support of a sling round the body will often so relieve the tension on the blood-vessels, that a second attempt at reposition will succeed half a dozen hours later, if we fail the first time. As erectile tissue is much contracted by cold, we may wrap the penis in ice-water, or apply evaporating lotions, to assist us in getting it back. When the penis has been long-suffering, and decomposition is feared, it may be necessary to make a number of lancet pricks (scarification), which will release much morbid fluid and shrink the organ; a process which will be favored first by hot fomentation, and then cold. Exercise favors absorption, but this must not be prescribed if the swollen organ swings from side to side, and puts a strain on the blood-vessels. Support from a flannel-roll or a sheet, may be given during walking exercise.

Edema of the Sheath.—The loose structure of the sheath favors the accumulation of fluid within it, and many horses that have no real constitutional weakness, are liable to more or less swelling of it, when compelled to stand for days in the stable. It also occurs from debility, and is in the nature of a dropsical effusion. Old and debilitated horses are prone to it. In the healthy, the swelling is soon absorbed when at work. In the chronic, there is some reduction of the volume, but not an entire clearance. A swelled sheath in a gelding should receive attention, as we have pointed out in connection with phimosis and paraphimosis, and exercise alone should not be trusted to remedy it. Our attention is often called to the necessity of lubricating the yard, if we understand the meaning of the sound made, when a fresh gelding is trotted out. Many men who were practical horsemen in other matters, have been quite astonished when told that the noise is caused by air drawn into the sheath, when the penis has been retracted, and unable to escape, on account of the sebaceous accumulation. The swelling of the sheath is often entirely due to this irritating material, which inflames the membrane. In all cases of edema of the sheath, whether due to or accompanied by debility, the patient will benefit by cleaning out and greasing the parts. Every good horseman should be both willing and able to carry out this unattractive task. There are several methods, but that most easy to the operator is to do it in two instalments. First, he should engage another person to hold up a front foot, when the patient will be less likely to try a cow-kick on him. (See Methods of Restraint, at page 414.) Then he will push a few ounces of vaseline, or unsalted lard, as far up the sheath as he can, and leave it there, then pass a roll of soft material round the body, to retain it, and half an hour later, he will be prepared with warm water and soap to syringe forcibly, or sponge out with his hand, and remove all the objectionable accumulation; an amount which will astonish him, if he hasn't seen the operation performed. Finally, a large quantity of the lubricant should be introduced. Immediate relief is experienced by the patient, and often a complete subsidence of the swelling takes place after a little exercise. It is advisable also in bad cases, to grease the outside skin as well. In all cases of phimosis, paraphimosis, and of swelled or edematous sheath, this cleansing and oiling operation should be performed. It will often be all that is needed. In some instances, pricks from the clean lancet will be needed, and in others, a course of tonic medicine, a combination of iron and gentian, with a little nitre, being as suitable as any.

Amputation of the Penis.—A form of cancer (epithelioma) attacks the penis of the horse, and when once diagnosed should lead to amputation. The length of the organ favors this drastic treatment, as enough will remain for any but sexual purposes, and it is of the gelding we speak more particularly, he being the usual subject. Having cast the patient in hobbles, and put him under the influence of chloroform (see Methods of Control, at page 414, and Anesthesia, pp. 389, 390), we draw out the organ to its fullest extent and place a ligature behind the diseased portion, making sure that only sound tissue is behind our binder.

The offending portion is then cut off with one clean sweep. If any vessels threaten to cause hemorrhage, we may take them up with forceps, and ligature them with fine silk, leaving them to become detached later, or we may resort to the apparently rough but vastly better plan, of searing with a hot iron at a dull-red heat, until we feel assured the mouths of the vessels are closed. Then a liberal dressing of vaseline containing five per cent. of carbolic acid, and the ligature may be removed. The crushing instruments called ecraseurs are often used for this purpose, when the searing with the hot iron is not necessary.

Bulls and rams, particularly the latter, are subject to an irritation of the worm-like extremity of the penis, and an accumulation of sandy material, which renders them incapable of sexual intercourse. This may be generally cleaned away by a patient operator, with his fingers, a syringe, and a sponge with soap and warm water, and subsequent repeated lubrications with carbolized vaseline; but in cases where treatment of the kind fails, or the trouble has not been diagnosed in time, it may be necessary to exercise this vermiform process, as it is called. Much the same measures as above advocated are suitable, but it does not seem to be generally known that amputation of this portion of the organ is quite harmless, so far as the animal's fecundity is concerned.

Gonorrhea, Clap.—(See Bull Burnt in Cows, page 204.)

Orchitis, or Inflammation of the Testicles.—This is to be distinguished from the more common inflammation of the scrotum, or purse containing the glands. It is generally associated with it, but may exist apart. Bulls, boars, and dogs, are not infrequent subjects of inflammation of the skin of the scrotum, from lying on frosted grass, chills when the parts are wet, injuries in jumping fences, and from brushwood and rough forest land, and in dogs while hunting hedgerows, and swimming in ice-cold streams when heated. The skin is then hot, tense, and shining, and very tender to the touch. Inflammation of the testicles more often happens to stallions and bulls, through misdirected efforts in leaping upon the female, or from kicks, or blows, from excessive service, and the drugging, and excessive feeding, which is the custom in respect of traveling stallions. Besides those external symptoms of the skin already mentioned, the subject of orchitis has swollen and intensely tender testes, which can be felt through the sympathetically inflamed integument: the animal is feverish and dull, loses appetite, straddles in his gait, frequently lifts his hind-quarters, and is generally tender over the loins. The inflammatory action is in some cases so great, that an abscess forms in the substance of the gland. In others, notably the frost-bitten, some part of the covering (scrotum) dies, and sloughs away, exposing the already inflamed testicle to still worse effects, and necessitating the removal of the organ.

Treatment.—This must be aimed at reduction of the local inflammation, and of the concomitant fever. A bold dose of aloes for the horse, boar, or dog, and large quantities of salts with aloes, for bulls and rams. A suspensory bandage should be fixed up, so as to come over the loin, and with a crupper-piece under the tail, to keep it from being displaced. In this, soothing poultices can be held in contact with the suffering parts. (See Sick Nursing, at page 418.)

In the case of a vicious and unapproachable animal which cannot be poulticed, we may secure him with a twitch, while a foreleg is held up, and with a continuous pump or enema syringe, give frequent and long fomentation, with warm water in which extract of belladonna and glycerine has been mixed. Warm applications to the loins, as a pillow-case filled with spent hops, or mashed turnips, or bran, will give comfort, and warm, soapy injections per rectum are very soothing. Laxative foods (see Foods for the Sick, at page 418) only should be allowed, until the symptoms abate, and then a gradual return to ordinary rations.

Inflammation of the penis is occasionally suffered by boars doing too frequent service, and by dogs doing none. For the former, syringing up the sheath with a lotion of boracic acid and glycerine, and rest from the stud, is advised. For the latter, a drastic purge, and two days' abstinence from food, followed by reduced rations, and the lotion advised for boars. Some dogs incur this trouble by masturbating, and such unseemly beasts ought to be castrated.

Diseases of the Female Organs of Reproduction.—These being almost confined to causes arising out of reproduction will be all considered under the chapter dealing with pregnancy and parturition (which see, at page 200).

CHAPTER IX

DISEASES OF THE FEMALE BREEDING ORGANS

Parturition, etc.—To the stock-breeder, there is no veterinary subject of equal importance to those diseases affecting the organs of reproduction. Those affecting the male have been considered in a separate chapter; others, communicable between the sexes will be mentioned in the present chapter, and the reader is further referred to the subject of Dourine (at page 191). The physiology of reproduction is too great a subject to be dealt with here; we have rather to deal with the hindrances, the interruptions, the difficulties in giving birth, and the ailments consequent upon the act of parturition. In all the domesticated animals there must be first the production of ova, next the fertilization by the male, and finally the delivery into the outer world, when the period of gestation has been accomplished. First, then, as to the hindrances. Those of the male have been considered. Copulation may be impracticable on account of imperforate hymen, or a strong, even cartilaginous partition within the vagina. The hymen in animals is not so well developed as in the human subject, and in the latter, it is usually of so delicate a structure, that it is often ruptured in the gambols of childhood, as to be absent in virgins. In bipeds, and in some few mares, heifers, gilts, and bitches, it occasionally attains a strength and density that offers resistance to the male, and one or other desists from the attempt at copulation on account of pain or failure to complete the act. When the desire is evident, and failure observed, an examination should be made, and the resisting curtain forcibly ruptured. In a day or two, if the œstrum has not passed off, the necessary act will then be accomplished, or it may be deferred until the next period. Syringing out the vagina with a two per cent. boracic acid and glycerine lotion, will prove soothing to the slightly inflamed parts.

Polypi.—Soft, spongy growths sometimes occur within the genital passage, and prove a hindrance. They have usually a small neck, and can be easily removed by a tight ligature in the manner directed for warts upon the skin. (See Warts, at page 271.) A simple antiseptic lotion as advised above will be all that is needed.

Constriction.—A hindrance to conception, both in virgins and females which have borne young, is not infrequently found in the closure of the narrow neck of the womb called the os uteri. This is normally closed: the uterus is spoken of as a closed cavity when the animal is not at œstrum, or is already pregnant, but should be open at the time of copulation to afford the easiest possible ingress to the male sperm cells. This is stated as a matter of practical experience among studsmen, who make a practice of introducing the hand, and dilating the os with their fingers, in the case of mares, and does not contradict the generally accepted theory that the spermatozoa, which are like tadpoles and endowed with motile powers, can and do reach their destination either by their own volition or are carried thence upon the waves of ciliated epithelium, which may be compared to a field of waving corn, and whose cilia move in the required direction. There has been much controversy on this subject, but the practical farmer will probably agree with the present writer, that the chances are increased by a larger aperture: that, for instance, you are more likely to get mosquitoes through an open door than through the keyhole, but that both methods are possible. The os uteri, after a difficult or protracted labor, shares in the inflammation excited at the time, and may thicken, harden and contract, and prove a serious hindrance to conception: so much so, that artificial insemination has now become well-known and widely practised, and many valuable animals have been saved to the breeding-stud by its means. This sterilized instrument takes the place of the male organ as a conduit. The semen is collected in the vagina of an animal just served, and is then transferred to the uterus of the female it is desired to impregnate. There is an increasing value attached to this method, but like other boons it carries with it certain disabilities, as, for instance, the proof required by some of the breed societies as to pedigree. This difficulty can be overcome by certification and attestation on the part of the owner of the male, and similar precautions on the part of the recipient of the semen, and its use upon a certain occasion being duly witnessed.

Acidity of the Vagina or Uterus.—A very constant difficulty with mares and cows, and probably with other animals at heat, which fail to conceive, is an acid state of the vaginal mucus which proves fatal to the male germs, or so affects their virility, as to make them fail in their mission. The inseminator overcomes this trouble by carrying the seed beyond the danger zone, if the vaginal membrane only is affected, but does not of course protect from an acid state of the uterus itself. The acidity is nearly always confined to the outer passage. The causes of acidity are several. Any departure from health may induce it. A condition of blood, such as favors eczema and other skin eruptions, is also liable to influence the mucous membranes. Sour bran, frosted roots, mowburnt hay, kiln dried or badly harvested corn; any food stuff which disagrees with the animal, or any kind of indigestion from whatever cause, may be reflected in the vaginal mucus. A number of experiments conducted by the British Board of Agriculture, go to show that an infectious vaginitis with acidity, is quite a common complaint among cows in the highly artificial state in which they are generally kept. This hindrance to conception then is one of the most common. The vaginal mucus should give a slightly alkaline reaction, and the agricultural student can satisfy himself by using test papers.

Treatment.—If due to dietetic causes they will of course be removed. At the same time the animal may be given a suitable aperient, and for a week or so before she is expected to be in use, a daily dose of some alkaline bicarbonate, as potash or soda. An ounce twice a day is a suitable amount for a cow. This has a distinct influence upon vaginal and urethral membranes, and is prescribed for gonorrhea when there is scalding, with good effect. After a course of this medicine internally, an injection is finally used some twenty minutes before service, consisting of one ounce of bicarbonate of potash dissolved in thirty ounces of tepid, not hot water, as the latter reduces it to carbonate when it is more or less caustic in action.

If the trouble is catarrh of the membranes, infectious or otherwise, it needs more active measures, and injections of one ounce of carbolic acid (pure), two ounces of glycerine, and twenty ounces of warm water, may be given for several days, changing this to the simple five per cent. boracic acid lotion. No mare or cow with infectious vaginitis should be served, until the owner is satisfied that she is incapable of infecting the sire or bull, and thus carrying the trouble round the country.

Diseased Ovaries.—There are mares and cows, as well as sows and bitches, which are continually at heat but never conceive on account of imperfect maturation of the ova. The ovarium, or egg producing apparatus, undergoes structural changes; sometimes of a soft and enlarging nature, provoking not only periodical heats, but sexual excitement and desire for the male at irregular short intervals. In such cases, the ova are either absent, or so imperfectly formed as to be incapable of fertilization by the male. In other cases the ovarium undergoes a fibrous degeneration, gradually contracting and squeezing out the ova, or killing them by pressure. While one ovary, or part of one, remains capable of production, the periods of œstrum recur, perhaps irregularly and in modified degree, and conception may still be possible, if service is given at the critical hour, but the animal is more likely to fail to conceive. The formation of cysts or bladders in the ovaria, which often attain to very great size, account for many cases of sterility. The structural changes and diseases above referred to, are such as usually come in middle or advanced age, but heifers and young mares are sometimes useless for breeding on account of inflammation of the Fallopian tubes, which are the conduits for the conveyance of the ova into the uterus.

Treatment is not hopeful, and save in the case of some pedigree animal from which it is specially desired to get another specimen, it is better to devote the animal to labor, or fat off for the butcher: or if the temper is seriously affected, as it may be in mares, the operation of spaying, or hysterectomy, may be performed *under chloroform, by a good surgeon,* and with antiseptic precautions. (See Castration and Spaying, pp. 368, 373.) The alternative is to place the animal under favorable hygienic conditions and give a course of iron and nux vomica. (See Dose Table, at page 433.)

Whites, or Leucorrhea.—Old mares and cows are prone to this trouble, which would seem to be a form of debility, and unconnected with breeding. In the young it follows on difficult labors, on irritation of the membrane from any cause, and as a chronic gleet after vaginitis, previously described. It resembles the gleet of the nasal passages. The discharge is of a thick glutinous nature, and dries around the orifice or lips of the vagina, and is ejected in variable quantity and consistence at different times. It is always associated with debility and ill-thriving. When the placental membranes have been long retained, as a result of premature birth, and have set up a septic condition, whites take on the worst form, the least objectionable being the senile leucorrhea first mentioned.

While suffering from whites, conception is very unusual, for reasons already mentioned in connection with acidity of the mucus.

Treatment.—Mineral and vegetable tonics combined, together with good and generous rations and pure air, comfortable housing, and dry bedding. Direct treatment of the membranes by the carbolic lotion is advised (see p. 203, Vaginitis, p. 202), and a variety of astringent injections, as three to four per cent. warm lotions of alum, sulphate of zinc, copper, and iron; varying these from time to time or combining one or more of them, as in one case, copper will prove the best, and in another, zinc, and in a third, perhaps a mixture will succeed where a single drug has failed.

Bull Burnt, or Infectious Gonorrhea.—An inflamed condition of the mucous membrane of the urethral canal of both male and female, and conveyed while in coitu. This is as a rule a simple clap, or gonorrhea, and all species are liable to it. It is most important in respect of mares and cows, because of their value, and of the risks of infecting other people's stock during service, and actions for damages which aggrieved persons may bring against stallion and bull owners. The discharge is more voluminous than in whites, and the membrane is inflamed, the urine appears to scald, and the patient may emit a groan when passing it. Pimples not infrequently form around the shape of mare and cow, and the prepuce of males suffers similarly. There is nothing malignant about this malady, which will not be mistaken for Dourine. (See page 191.)

Treatment.—A mild aperient and a few doses of saline medicine, as bicarbonate of potash or soda, and abstinence from sexual intercourse, injections of boracic acid and glycerine, or a two per cent. chinosol or other safe disinfectant that is not irritating.

Abortion.—We have considered some of the chief hindrances to conception, but the fruits may yet be lost when service has been accepted and pregnancy is assured. Among the common causes of abortion, of what is called sporadic or accidental, as distinguished from the infectious variety, may be mentioned, fright, over-driving, hardships of transportation by sea and land, falls, fights, and other external forms of violence, backing of loads by in-foal mares, dog worrying (in the case of ewes), and foods which disagree and upset digestion, or produce irritation of the urino-genital organs. Frosted roots, mowburnt hay and artificially dried oats, cakes containing pernicious weeds, etc. In addition to these there is grave reason for suspecting many of the Asiatic food products, as Burma, Egyptian, and Soya beans, which have been proved to contain cyanogen.

Any upset occurring during pregnancy, whether to the nervous, the digestive, or the urinary systems, may give rise to abortion or premature birth; a distinction sometimes made in respect to miscarriage before the time at which a living fetus can sustain life outside, and too early for perfection in all its parts. A seven-months calf may live: a six-months will certainly die when brought into the outer world. The one is deemed premature birth and the other abortion.

The symptoms of abortion are the appearance of a string of discolored mucus depending from the shape of the cow. Mares more often abort without any marked symptoms, or show some disposition to griping pains. The difference between solipeds and ruminants must here be remembered: the mare always giving birth in a very short time, if the foal is to be born alive, while the cow and ewe may be many hours in delivery, and the young may still survive.

It is doubtful if any treatment is of service when abortion threatens, as the operation is already begun, and is a process that can only be arrested by the expulsion or death of the fetus.

Infectious Abortion.—This is the great plague of modern times, and the source of more loss to breeders than all others put together. On big ranches where the sky is the only roof, there is least of it, but in the pedigree herd, of so much greater value, infectious abortion has brought ruin. The famous British herds from which the blood of the whole world has been from time to time refreshed, continue to suffer in increasing proportion, and the same may be said of the ordinary dairy herds in that country.

Cause.—A specific organism has long been identified as the cause, and a Danish veterinary surgeon (Bang) discovered the bacillus in the deeper layers of the membrane, long after its fell work was accomplished, laying up like a hibernating animal, waiting for another pregnancy to again become active, and repeat the proccss.

This was generally accepted in Europe for some years, and the experience of farmers seemed to agree that infectious abortion wears itself out in about three years, so long as no new stock is introduced; the bacilli apparently losing vitality after a certain number of broods have been hatched. This is not much comfort to the dairy farmer, as he must from the nature of his business be frequently buying in-calvers at different times of the year, in order to keep up his contracts for milk to send into the cities. The British Board of Agriculture has been investigating the subject for a long time, and has issued an interim report which is not very encouraging, as it condemns with ridicule thc practice of carbolic saturation so-called, while as yet having no reliable remedy to offer us. Always on the lines of cultures for the production of an immunizing serum, the Board has made experiments which it is hoped may later prove protective under certain limited conditions.

The method of infection is believed to take place through the bull, who remains infected by some cow that has been served by him. Also through the vaginal discharges passing from one cow to another, by means of the attendants employed on the sick and well in the same building, through the air, by inspiration and ingestion.

Nocard, and other eminent French and German scientists have investigated the subject, and suggested treatment by way of prevention and cure, but the methods are more or less impracticable because requiring such unremitting attention as no one with his living to get can afford to give: besides which, failure has been often the result in the fancy herds of rich men who have been willing to lose money on extended trials. As, however, Nocard's recommendations still hold the field, we may repeat them here, before passing on to comment on the later experiments.

Immediate isolation of cows aborting, or showing signs of doing so. Burn, or deeply bury the fetus of cow or ewe together with its envelopes (after-birth or cleansing).

Syringe out the organs with a germicide, and with the same, dress the external parts, including the shape, under side of tail, and where any discharges may run down.

For the above purpose, may be employed a mixture consisting of one part corrosive sublimate, forty parts common salt, four thousand parts distilled or clean rain water.

All cows that have been in company with the aborted to have the tail and external organs daily sponged over with a five per cent. solution of ferrous sulphate (sulphate of iron).

Cows which have aborted, to be fed off, for the microbes are dislodged with difficulty, and fresh generations are liable in subsequent conceptions to repeat their attack.

Bulls with any discharge should not be employed.

Treatment after abortion.—Syringe out with the lotions recommended as preventives (above). Give the animal a quiet box free from excitement of every kind. If there is straining, a dose of opium or chlorodyne. Cleanse from all discharges and give a saline aperient if any tendency to constipation.

The treatment above advised applies to other species where infectious abortion exists. The worst of the above troublesome measures is, that on some one or two occasions the business is forgotten, or not carried out by a man entrusted to do it, but who does not believe in it.

Carbolic Saturation.—By this term is known the practice of administering carbolic acid in small doses at first, and increasing them as toleration is experienced, until half an ounce of pure acid is taken twice a week in some linseed tea, or gruel made from cake dust, or in linseed oil. It is a caustic substance by itself, and should be softened either by the above methods or by admixture with its weight of glycerine, before adding water. Mr. Peter, the agent of Lord

Fitzhardinge, advocates this plan, as he believes that he thus cleared the herds under his charge. This gentleman read a paper before the Gloucester Chamber of Agriculture, which was widely disseminated in Europe, and largely acted upon: many experimenters declaring in its favor, and a few adversely. The British Board of Agriculture only tried carbolic acid on one cow, and finding the bacilli present, condemned the practice as useless. Different States in the Union are carrying on experiments at the date of writing this, and we shall no doubt have an early pronouncement on the value of prophylactic methods. Mr. Stockman, F. R. C. V. S., chief veterinary adviser to the British Board of Agriculture, is of opinion that infection by the mouth is most probable, that there is very little risk from the bull, that the infection of the cow only lasts about two months, and that the specific organism survives outside the animal for a much longer period. These views are so adverse to the opinions held by previous investigators, that we can only wait for further light on the subject. The protective serum manufactured under this gentleman's auspices is believed to confer immunity on heifers, treated before becoming pregnant, but has the disadvantage of being liable to infect such as have already conceived. Before leaving the subject of carbolic saturation, in which so many put their faith, we may remark that other drugs persistently employed, make the host untenable, as in the case of the ray fungus which causes wooden tongue (actinomycosis), and mercury has been known for generations as the antidote for syphilis. Despite the ridicule of the British Board, there is experience in favor of the theory of so-called saturation, as means of destroying or inhibiting disease germs.

Parturition.—This act is to be considered as a physiological function, and not to be regarded as an inevitable illness or a *damnosa hereditas* descending from the garden of Eden alike upon man and beast. It may be said with truth that the nearer to nature the state in which animals live, the less trouble is experienced in parturition. It follows that the pampered herds or refined breeds entertain greater risks in giving birth. This physiological act is not governed by immutable laws, but subject to many deviations, and the time and manner of bringing young into the world vary in each case. Pain is the common lot. There are cases in which the accoucheur has before him a problem only a little less difficult than the passage of a camel through the eye of a needle. But a few minutes will be occupied in a normal presentation in the mare, while many hours and even days may be occupied by a cow in expelling a dead calf. The foal will be almost certainly dead if a mare is in labor more than half an hour, and her own life will be risked if the period extends to two hours. The cow and the ewe recover from very protracted labors, but the otherwise hardy goat is more likely to succumb. In the case of gilts, there is often difficulty, owing to a small passage and imperfect dilation, but a sow that has had several litters, or a bitch under like circumstances, will bring young into the world with only slight labor pains, and apparently very little distress. In the case of roomy old sows, the pigling will often be shot out in such a manner as to turn head over heels, and land some distance from his mother. Labor pains differ in force and frequency, as does the amount of fluid in the water-bags. The fetus is found in all sorts of attitudes or presentments, some of which offer hindrances to birth, and will be described on another page. The final act of parturition has been in preparation during the whole time of gestation, the womb has been increasing in size, and its muscular coat acquiring strength. When the fetus is nearly fitted for life outside, changes take place in the uterus, as well as in the connections between the mother and young. Fatty degeneration overtakes the parts connecting them, and the blood supply is diverted from parts no longer in need, to the udder, where milk is to be made by the mammary glands. When the degeneration of cells has reached a certain stage, an irritation of the nerve terminals sets in, and causes contraction and separation between the fetal envelopes and uterine walls. Labor pains are retarded, if this process has been irregular or premature. The chief expelling force is due to the muscular layer of the womb, which up to this time has been gaining in power. The pressure of the waters from behind opens the lock-gates, or narrow neck called the os uteri, and the neck is indistinguishable from the rest of the viscus. The early opening of the neck, and protrusion into the canal of the water-bag, helps in distending it. The canal is predisposed to yield to the pressure; it is the "forcing of an open door," as the French have it.

The prolongation of labor is due in greater part to delay in dilatation of the passage, rather than to a large fetus, and a small canal; although the latter is a not infrequent cause of dystocia. Supposing a normal presentation, feet and head well within view from the outside, the contractions of the womb and pressure of the amniotic fluid are aided by the fixing of the diaphragm and muscular contractions of the walls of the abdomen; the latter being the ordinary means of expulsion adopted in defecation, and specially noticeable in constipation.

Presentations are of great variety. Fig. 13 may be taken as the best. The two front feet slightly in advance of the head. The pains, or throes increase in frequency and force, and as soon as the waters have broken, the fetus makes progress more rapidly. This movement is facilitated by the amniotic fluid having lubricated the passage.

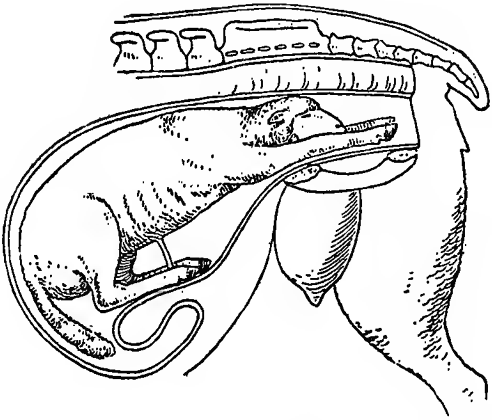

Fig. 13.—Ordinary Head and Front Legs Presentation, in which Assistance is Rarely Needed Unless Labor is Protracted.

If rupture of the sac occurs prematurely, or a rift occurs a day before labor, and this fluid is lost by leakage or comes away in a flood, there follows what is known as a dry labor, and the difficulty of delivery is greatly added to. The lost " waters " are best replaced by very dilute glycerine, as an ounce in a pint of water; this warm and lubricating fluid being syringed into the canal from time to time. In the case of twin calves or " doubles " in ewes or other animals, it is very common to find the first a head and foot presentation, and the second a breach of presentment. (Fig. 14.) In those animals which usually only give birth to one fetus, the presence of twins causes more than normal distention, and consequent weakening of the uterus, labor is slower, and a variable interval occurs between the births; there is, moreover, a disposition to premature birth in twin foals and calves: not so much so in those breeds of sheep of which doubles are expected and in multiparous animals like the sow and bitch. In the case of twins, there is simultaneous contraction of both horns of the uterus, but precedence is allowed to the foremost fetus. This, like every other generalization which scarcely amounts to a rule in parturition, is often otherwise, and an interval of a week may occur between the birth of two calves. The second in such case is very apt to be dead, but not necessarily so. These contractions of the uterus are not absolutely confined to the act of parturition; they are experienced in certain urino-genital troubles, and often for some time after delivery when the mother gives suck, or is hand-milked. If the uterus is empty by reason of the fetus being carried outside it (extra-uterine fetation), and in the abdominal cavity, the same contractile process occurs as if there were a body to be expelled. So also with virgin bitches which give milk at a time when they would have had young if mated. The uterine contractions and the mater-

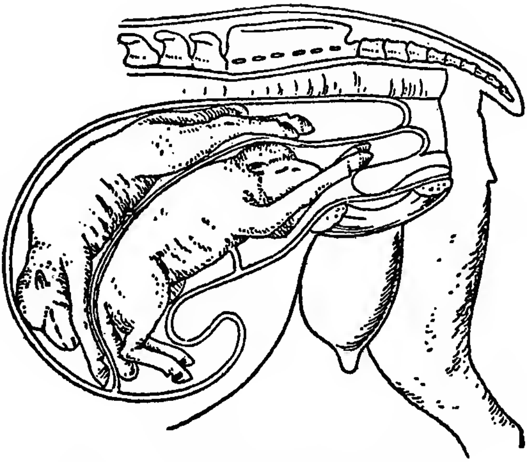

FIG. 14.—FORE-AND-AFT PRESENTATION.

nal instinct are often very strong in unimpregnated animals, and bitches behave as if they had dreamed of a family, and seek their imaginary offspring in all sorts of likely looking places where a nest would have been chosen.

The throes, or labor pains occur at shorter and shorter intervals, and with increasing force until the fetus is expelled. In the large animals the weight of the depending portion aids the birth of the remainder of the fetus, but injury is prevented by the prominent hocks breaking the fall when the mother is in a standing posture. Mares more frequently give birth on the ground, but getting up and down as they are taken with labor pains, the foal may be born while the dam is on her feet. Ewes generally retain their feet. Sows and bitches give birth upon the ground, curling the body round, and heaving upon the breast-bone: a position favorable for lingual attentions to the new-born, which they continue to give between the birth of each puppy, unless, or until distracted by the pains attendant on the arrival of the next.

Up to the time of delivery, the contractions or labor-pains have risen like the tide to a maximum: with the expulsion of the fetus the ebb sets in, and only sufficient force is exerted to expel the fetal envelopes, or cleansing, as it is commonly called.

So far, we have merely outlined a normal labor, with a normal presentation; there has been no need of the accoucheur, and he had better stand aside and let well alone, his temptation being always to interfere prematurely, and his wisdom is best shown by knowing how to wait.

Difficult labors, and malpresentations, call forth all the resources of the experienced veterinary surgeon, but the majority of cases needing human aid will have to be undertaken by the breeder, and it is a subject upon which every young farmer and stock-breeder should bestow earnest study. He should lose no opportunity of watching normal births, and seek every chance of assisting his neighbors in order to acquire experience which will be invaluable, if he knows how to store it and bring it to bear on future occasions.

In the following pages we propose to describe the chief malpositions with which he will have to deal, supplementing our descriptive efforts with rough sketches or diagrams, which will give an idea of the attitudes assumed by the unborn, or those entering upon the world. First let us take the simple misplacements which can be easily rectified, although rendering birth impossible without outside aid. A doubled-up fetlock in the passage will need only to be pushed back slightly and the foot pulled up and into line with the other. One leg back. This is a more difficult case, because the head and other leg already fill the passage, and we have got to pass our hand through to get up the other member. The best way to do this is to push against the breast of the fetus, while holding the advanced limb and pressing back the whole; then we may bring up the missing one. It is well to here impress the beginner with the importance of remembering that there is always *plenty of room where the fetus came from,* and that to push back, is the way to relieve the painful compression on one's own arm, and to give space for working within, when in search of a missing head or doubled-up limb. The beginner is always afraid of letting a foot or other portion of the fetus go back, and out of his sight. This is a thing to be overcome, or he will never make a successful accoucheur. If a cord or noose is put on a limb, and the end left out, we can always find it again, and have the power to bring it up, too. If more than one cord is employed we can make knots or loops in them by which to distinguish one part from another. If I could give but one lesson to a pupil going into the cattle-breeding business, I would spend all the time in impressing him with the value of putting back, and pushing back, in order to get up, or turn, or accomplish, any of those movements described in this chapter. Dead pulling is no good. In a passage completely filled already, you are no good either: you must push back the body of the calf or other animal. There is an instrument called a crutch (see Fig. 15), which you can work from your shoulder, while enjoying the use of the hand inside. This, or an improvised implement made from a spade handle has served the

FIG. 15.—CRUTCH.

writer in many difficulties, and overcome the immense force which mares and cows have exerted upon his wearied arm. Every accoucheur should learn to use both arms, as he can get relief by changing them, and save valuable time, for the beast will not strive after a certain time, and delivery is then much more difficult, especially if a dead fetus has to be extracted.

A head in the passage with both legs turned, is a case requiring to be put back, as one cannot pass an arm by it in order to bring up the limbs. One should be corded without bringing it up; then the other. Next the head should be placed in the right direction, with the feet on either side, and traction exerted on all three until a favorable position is attained: then time should be given for the natural throes. In this, as in all cases, the accoucheur should *pull when the animal strives*, and desist in the intervals. A not infrequent presentation is that in which the fore limbs are found in the passage but the head is turned back. It may be that only the chin is tucked in, and that a little manipulation will put matters in train. On the other hand, a very difficult job may be found in bringing the head up from a position right round against the flank. Looking at the short neck of a new-born foal, or calf, it seems difficult to imagine how far backward a head can get; right back to the hip it may be,

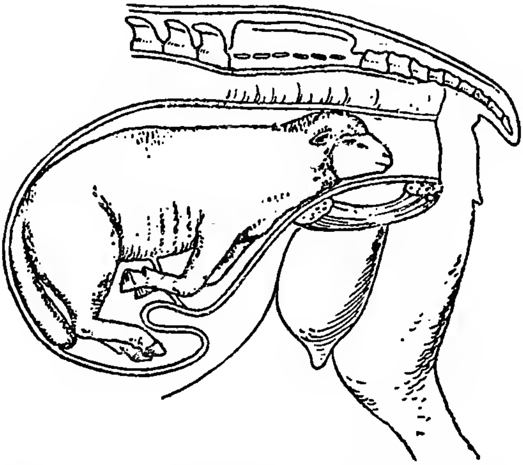

FIG. 16.—HEAD IN RIGHT POSITION, BUT LEGS DOWN.

and this is, of course, favored by the fetus being curved within the womb. There is no hope of delivery without getting the head up. Here again the crutch comes to our assistance. We push the chest while exploring for an ear to pull, a nostril or an orbit into which to thrust a finger and thumb, or working our way along the neck, arrive at one of these parts. Although so difficult to find, when once we get hold, the resistance is frequently inconsiderable, and by a few repeated efforts we get round the head, the pushing the body forcibly back, we succeed in getting it up into the passage. Another wait, and the probability is, the youngster will come by the dam's own efforts. Breach presentations offer another set of difficulties. The ordinary breach presentation is one in which the feet are seen first, and nearly level. Assistance is only given when the labor is protracted, and progress is not being made, and when it is observed that the force and frequency of the throes are diminishing: then are we called upon to act, and not before. The obstruction may be caused by an unusually wide pelvis or big buttock, but this we do not know at the time. Taking both pasterns in hand, we turn, as well as pull, until the hips of the fetus have passed the most difficult place: then a pause before the resistance of the shoulders

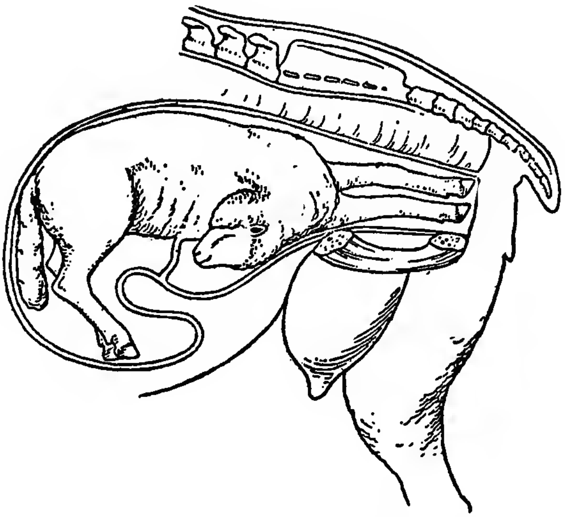

Fig. 17.—Legs in Line, but Head Turned Back.

may be expected. An exhausted mother should here be given a stimulant, as a gill of whiskey in a quart of gruel, and as soon as she strives again, we can give help, not pausing when once the head is in the passage, as by this time her powers to bear pressure within will have reached the danger point, and subsequent inflammation is to be dreaded. Breach presentations offer many difficulties. The legs may be bent at the hocks, and must be got up and into line. To ascertain their position as well as that of the fœtus generally, we feel for the tail, and judge by its setting whether the youngster is on his back, his belly, or his side. Some amount of twisting as well as folding of the limb, will give us help, but we must always push back the rump in order to get room to work. Some of these cases are most disconcerting: there may be nothing felt but a hard, hairy mass pressing against the brim of the pelvis, not a sign of a leg or a tail, a foot, an ear, or anything by which to tell if it is a rump, a breast, or a side, we are in contact with. It is no use to be flurried: we must take time to consider. Perhaps we shall get unexpected help from outside, by kneading the flank with our hands and discovering the position of the head. If so, we get our mate to put his knee behind it, while we push back the body with the crutch and explore in the direction indicated: then proceed as in other front presentations, by getting head and legs into line. One leg may be down, and the

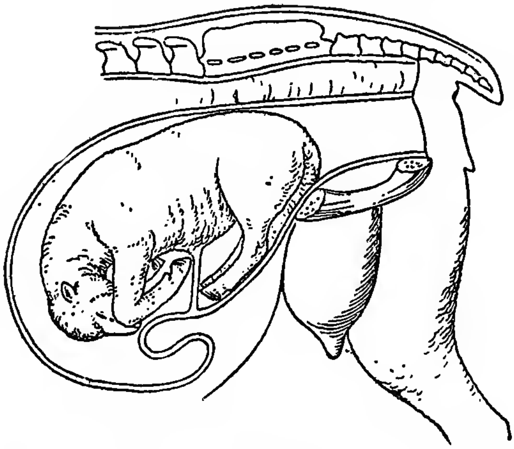

FIG. 18.—BREECH PRESENTATION, WITH LEGS DOWN.

mare or cow exhausted with useless striving before she is discovered. In this case we make good use of the leg that is in the passage to push back the body, while seeking the displaced limb. There is no worse presentation than that in which the hind legs are both down and the rump jammed against the passage, but not in it. The difficulty consists in pushing back the body far enough to get up the first leg. One will often get hold of the hock, and perhaps some way down towards the fetlock, but cannot get the latter past the brim of the pelvis. If another man can use the crutch and the operator's arm is long and thin he will have a better chance. If one leg can be got into line, the second one will be comparatively easy. When the fetus is folded up like a cat asleep before the fire, time will be well spent in thinking out a method of procedure. It may be easiest to turn the creature head over heels, or slue him on one side, but when found to move more readily in one direction than another, the operator should willingly change his plans.

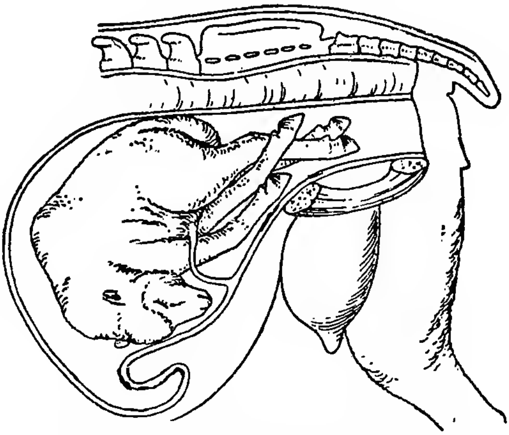

Fig. 19.—A Case to be Turned Over.

A dead fetus is always more trouble than a live one to deliver. There are cases in which it is impossible to extract the fetus whole. We must then endeavor to dissect him by carrying in an embryotomy knife, which can be opened within the uterus, or else conceal a short, open castrator's knife within our partially closed hand. It is the skin that offers practically all the resistance to dismemberment, and our object is to cut this covering and get our fingers underneath it, when we can pull and tear away limbs at the articulations, so as to leave no ragged and wounding surfaces to injure the dam. If we must decapitate the animal, we do so behind the head, leaving only the smooth articular surface. Sometimes the difficulty of extraction is caused by a dropsical belly, and this must be punctured, with

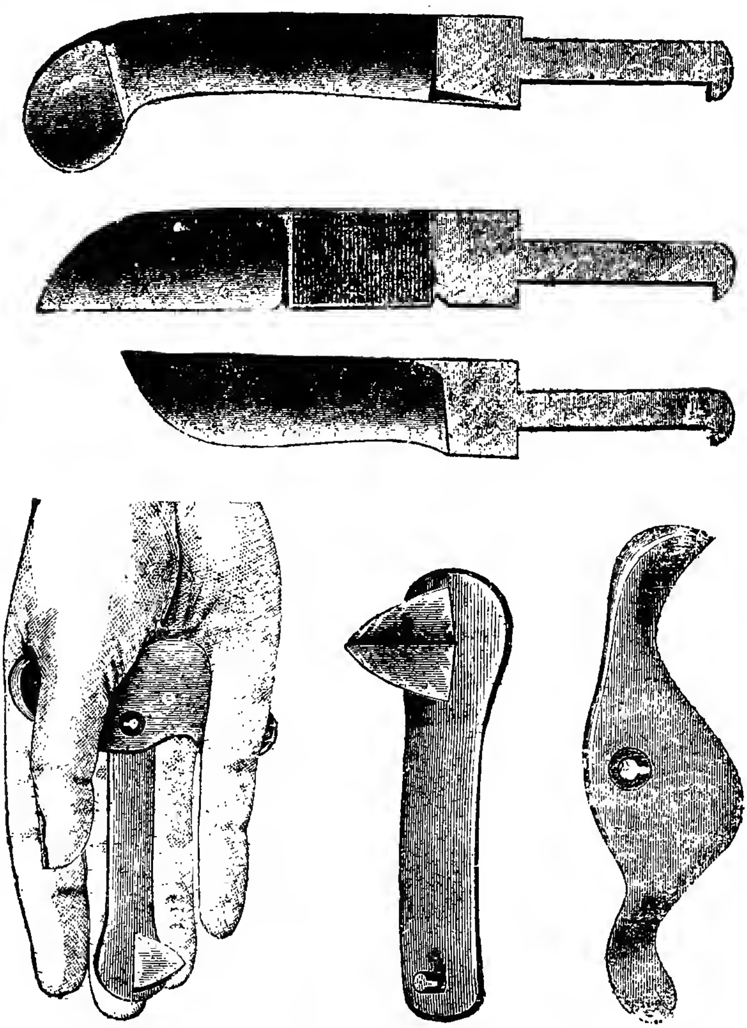

Fig. 20.—Embryotomy Knives.

an avoidance of injury to the creature's intestines, which we may pull out, but do not wish to break because the contents are liable to poison the mother through any slight abrasion of the membranes, over which we have been operating.

Monstrosities have to be dealt with in all sorts of ways, but the chief thing to be remembered in getting out a fetus by dissection, is to make long incisions in the skin before attempting to separate the members.

Not Cleansing. Retention of the Placenta.—The fetal envelopes should come away with a few pains following on delivery. In mares, sows, and bitches, there is seldom any great delay, but in ruminants the attachments by roses or cotyledons at a great number of points, favor retention. The fatty degeneration previously referred to, by which the attachment is dissolved, may be incomplete in a few of the roses, or the neck of the womb may have closed too soon, and gripped the placental envelopes. The former cause is the one chiefly operating in premature births, and it is quite a common experience to find cows retaining the afterbirth when they have aborted, or failed to go the full period of gestation. The enclosure of the placenta is more likely to occur in a vigorous mother that has given birth without difficulty, and whose contractile powers have remained in force and with some energy in reserve. In either case it is desirable that the cleansing should proceed by the removal of the membranes.

Treatment.—Tradition says that a " cleansing drink " should be given, consisting of some saline aperient, and in the case of mares and cows, fortified by a small quantity of aloes. (See Cleansing Drenches, at page 450.) If the action of ergot were not very doubtful in quadrupeds, the addition of it might be considered valuable, as we know its great value in human practice, in contracting the womb.

Mechanical traction is generally necessary, but this must not be too forcible, or too early attempted, or hemorrhage may be set up, and with difficulty controlled. Not until the second day after parturition should we attempt forcible removal, but in the meantime it is well to lift the mass, and syringe under it, as well as to flood the womb with a warm antiseptic, such as an ounce of carbolic acid, mixed with two ounces of glycerine, and a quart of warm water. Condy's fluid or permanganate of potash or soda, is also suitable. Some people attach a weight, such as a bag of stones or an old boot, and this inelegant method has the advantage of continuous traction. The writer has found the best results from a couple of fagot-sticks with the bark on: winding the membranes over these, and fastening off with string—plus a weight, to act between the daily windings up, which obviate the risk of breaking away a part, and leaving another to decompose, if a rash attempt is made to extract the whole placenta at one time. The corrupt mass is liable to cause septic poisoning, and in any case, the health of cow or ewe is not robust, so long as any portion of the cleansing is retained. It is, however, well-known, that a beast may ultimately recover unaided, although the only means of getting rid of the mass is by decomposition, and discharge, as a fetid dark fluid. Provided the genital membranes have suffered no abrasion, they have the power of secreting more fluids to favor the passage outwards of all that is undesirable. This is one of the slow methods of nature. It is borne worst by the ewe, and best by the bitch. In the latter, a dead puppy may rot away without causing the death of the mother, although the risk of death by blood-poisoning is considerable. A sequel to retained placenta, is vaginitis or catarrh of the membrane, and whites (which see, at pages 203, 204).

Eversion of the Womb, or Falling of the Calf-Bed.—This accident would appear to be due to some weakness of the ligaments, rather than to special difficulty in parturition, although a hard labor adds to the risks. It may happen immediately after extraction of the fetus, or the animal may have been left apparently quite comfortable, and be found on the next visit with the whole apparatus out upon the ground, and very likely trodden upon and fatally injured. Ewes, cows, sows, mares, and bitches, are the subjects of this malady, and in the relative frequency as above stated, so far, that is to say, as the author's experience goes, but there are no available statistics compiled by other practitioners. With the sow, and the bitch, unless the former is a very large one, we have the advantage of being able to elevate the hind-quarters, while attempting to repose the expelled substance. The excited mare offers the greatest difficulty of all. She, too, is the most likely to die whether or not we succeed in replacing the viscus without much delay. The sow most frequently recovers, but the bitch has only a fair chance. The method of procedure with the larger animals—take the cow, for example—is to procure a clean sheet, soaked with a disinfectant, another man having secured the patient, and prevented her from doing damage to the exposed uterus, while two or three hands are summoned to assist in holding up the sheet containing the womb, while it is carefully washed with a weak warm disinfectant, and all straws and rubbish removed. The men standing on each side and supporting the weight, enable the operator to replace the mass. This is so great that the novice is appalled at the prospect, but finds it not really so difficult to replace as he does to keep it when returned. The hand over hand manipulation is timed so as to push when the cow does not strive against the action, and to mark time, or merely press against the pubic region when she does have pains. With patience, the whole bag of tricks will be got in again, and if not injured while exposed outside, or by the operator's nails, she will have about an equal chance of recovery. Pressure over the withers hinders the desire to strive, as does a very bold dose of laudanum, say two or three ounces, or an ounce or more of chlorodyne, which may be repeated in three hours, if straining continues. Two or three drams of extract of belladonna rubbed down with glycerine, and inserted in the passage, or a pessary of morphia, is calculated to allay pain and straining, but it is essential to secure the lips of the vagina against the possibility of again extruding the womb. This is commonly done by putting strong stitches of white leather or tape, taking a very wide hold to prevent tearing out: but a far better plan is to apply a

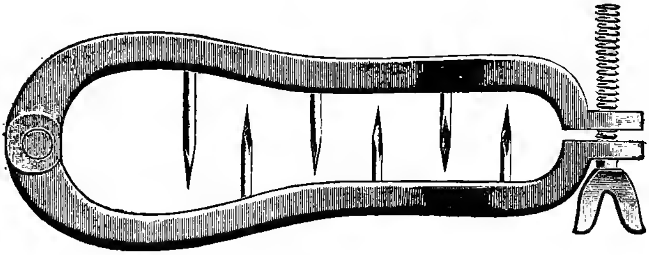

FIG. 21.—WEST'S CLAMP.

West's clamp which has needles nowhere opposite each other and which cannot tear. The instrument is regulated by a screw, and this admits of as much compression as is needed at the time and the relaxation of it to accommodate subsequent swelling. They are now sold by all veterinary instrument agents in America and other countries. Much syringing is risky, as very little interference is liable to excite fresh striving: rather do we narcotize the patient with opiates, and hope for the best, although tempted by all the rules of surgery to irrigate the womb with disinfectants. We have a choice of evils, and we choose the lesser.

Linseed oil in small doses, to keep the bowels in gentle motion but not to excite purging, and laxative foods are advised. (See Sick Foods, page 418.)

If the womb is injured while exposed, there is no choice but to put on a tight ligature and cut it off, disinfecting the stump and returning it. A few cases recover after this drastic measure is taken; sows bearing it better than other animals.

Inflammation of the Womb.—Animals are liable to inflammation of the womb, as a result of injuries to the membrane during parturition. A most fruitful source of septic inflammation is the rough usage they receive at such times by men who desire to assist them. Before introducing the hand into any cavity, it should be well washed, and the nails pared close, as the latter inflict slight abrasions, which allow of germs entering into the circulation. Instruments and ropes employed must always carry some risk of similar or worse injuries. It is also thought that a special susceptibility exists at such time, with or without abrasions. (See Disinfectants, at pages 410, 411.)

Inflammation of the womb may supervene on parturition within a very few hours, or after the second day, and even later, although the animal may have had a pretty good time in delivery, and sprung her milk, and gone on well in every way: but the evil seed has been sown, and will bear fruit although it may be slow in germinating. Cows sent on railway journeys, and on ships, and calving in transit, are specially liable to this disease, while those delivered in the quiet and comfort of their own farm-steading are comparatively immune.

Ewes are highly susceptible to this malady, and no shepherd should have charge of the lambing-pen, without a liberal supply of carbolized oil, great care being taken to avoid handling the sick or the dead, before giving assistance to the yeaning member of the flock.

Symptoms.—These come on suddenly in loss of appetite, and of milk, paddling of the hind feet, restlessness and sometimes hallucination. If any milk can be drawn, it will be discolored, and of a peculiar smell. The external genitals will be shrunken or drawn up, and when the lips are parted will be found high-colored, varying from a bright red to purple, and with streaks or spots at places. Frequent straining, and passing of a coffee-colored fluid of offensive odor, and an expression of countenance showing the animal is very sick, are unmistakable symptoms of inflammation of the womb.

Some animals, notably mares, strike at the belly as in colic (see Colic or Gripes, at page 100), getting up and down at frequent short intervals, but unable to find any attitude of repose or relief from pain. This disease spreads so rapidly in the ewe flock, that there can be little doubt of its infection being carried in the atmosphere, and it is advisable for this and many other reasons to have a sick bay where to take all animals showing symptoms of illness, or the least suspect.

Treatment.—This should be immediately directed to the source of the trouble, and any septic matter in the uterus neutralized by frequent injections of suitable disinfectants. Ewes bear carbolic oil as strong as one in fifteen, and we have known shepherds get good results with even more concentrated preparations. For large animals it is well to mix one part (by measure) of acid with two parts glycerine and twenty parts warm water, employing half a gallon at a time. The mere flushing and washing out of the products of inflammation, seems to make the patient brighter, and if a sufficiently large "dose" of septic matter has not already entered the circulation, a fair prospect of recovery presents itself. If thoroughly poisoned, the animal will rapidly waste away, develop a foul diarrhea, and if it does not die in the acute stage, will linger and finally succumb to exhaustion. An aperient should be first given, and then every means adopted to sustain the animal's strength. Large doses of quinine (see Table of Doses, at page 433), gentian, and dilute mineral acids, generally give the best results; quinine especially, as it seems to have the effect of inhibiting the septic organisms in the same way as in malarial fever in man. Light but nourishing foods should be frequently offered in small quantities. (See Sick Foods, at page 418.) Sows and bitches and cats are liable to absorb carbolic acid, and it should never be employed in their case, but chinosol or permanganate of potash or boracic acid used instead. This objection applies to all the coal-tar derivatives more or less.

Eversion of the Bladder.—During, or subsequent to parturition, or while suffering from inflammation, the straining may at any time cause the bladder to come out. If it is everted during inflammation, the prospects are bad. If immediately after a normal labor and not too long exposed, it can generally be put back.

Fatal consequences follow on errors in diagnosis, the bladder being mistaken for the water bladders or placental membranes, and punctured. (See Chapter IV, page 142, for means of identification and treatment.)

Dropping Before Calving.—A paralytic condition during the last few weeks, or more often days, preceding the date for calving, is commonly known by the above term, and was confused with milk-fever, which was formerly believed to be a kind of apoplexy, and known as parturient apoplexy. (See Milk Fever, at page 225.) The expectant mother may be fresh or full-blooded, but more often is a poor old thing that has been badly done, and has given all her strength to the fetus. The causes are probably of three or four sorts. In the good thriver there may be congestion of the spinal cord, or interrupted circulation owing to the distention of the abdomen and pressure of the gravid uterus upon the great vessels. In the poor cow, weakness is yielded to, and there being no necessity for rising, the beast remains in a position the least uncomfortable. The drain on her powers may have robbed the spinal cord of enough blood, and the necessary pressure, to enable it to perform its functions, and this would alone account for semi-paralysis of the muscles engaged in rising from a recumbent posture. Another, and I think a frequent cause of dropping, both before and after calving when there is no symptom of coma, is backache, in which the psoæ muscles under the loin (the undercut of the butcher) are chiefly concerned, and give rise to what we call in ourselves, lumbago. When we are suffering from lumbago we are probably free from pain, or from acute pain, while sitting or lying down, but rise to our feet and straighten our backs with great difficulty and much pain. When a cow or a grazing steer is thus afflicted, it will endure much punishment rather than encounter the greater pain of rising to its feet. If the annoyance inflicted by a dog is greater than the pain of getting up, the dropped cow will often manage to get on her feet.

Treatment will vary according to the supposed cause. The fresh cow may have a purge, and be persuaded to get up and be exercised after she has once felt her feet, and the stiffness has been rubbed out of her by a weak liniment and a strong hand. The purge will most likely give more room for the fetus, and a change of position on its part will relieve the pressure upon the great veins returning from the hind-quarters. I have seen much benefit to both the fat and the lean cow, by ironing over the loins with a hot flat-iron, a thick piece of brown paper being interposed between the instrument and the skin. Getting up to avoid a savage dog, and finding relief from ironing, poulticing, and warm liniments, are among my reasons for attributing some cases to lumbago. The really paralytic old cow must be supported by gruel and stimulants, in the hope of building a new cow on the old frame, when she has got through her impending trouble. The novice in such matters might well think that one so weak would fail to bring the calf to the birth, but experience points to a directly opposite prognosis. There is some imperfectly understood law of Nature, which cares more for the coming than the departing generation, and the three-cornered old cow, and the broken-bellied ewe, will give birth often to vigorous offspring, although at the point of perishing themselves. "The individual withers, and the race is more and more." The final effort of the disgruntled cow is to make milk for her offspring though she herself die of malnutrition. Good nursing will often save such a one. (See Sick Foods, and Nursing, at page 418.) Strychnine, or the nut from which it is derived, quinine, gentian, and the cordial carminatives with some ale or cider during the first few days, may decide the case.

Milk Fever, Parturient Apoplexy, Dropping After Calving.—This disease is still a serious source of loss to dairy farmers, and particularly to those who own the deep milking, improved breeds, these being much more prone to it than cross-bred animals, while the "butcher breeds," such as Herefords, the red Sussex, the old-fashioned long-horns, runts, and Highland cattle, are almost immune. Although no toxin has been definitely made out in the udder or the milk contained at about calving time, it is assumed that a self-eliminated poison is the cause of the auto-intoxication of the animal, which is overcome as by a powerful narcotic or snake bite. The coma of milk-fever was formerly attributed to blood pressure, more particularly of the back part of the brain (cerebellum) and upper portion of the neck (medulla oblongata), and some little distance down the cervical section of the spinal cord. If this congestion exists, it is effect and not cause; the cause being something originating in the udder, and having its special influence upon the parts above named, thereby producing paralysis and insensibility in varying degrees.

The *symptoms* are almost unmistakable, save at the commencement, when a little preliminary excitement and paddling of the hind feet might be attributed to other causes. Before long the patient becomes unsteady on her feet and presently goes down, wears a lost expression, moos or moans, throws her head back to the side again and again, before passing into a state of complete insensibility, when she will disregard a finger placed upon the otherwise sensitive eyeball, and lie upon her side breathing heavily, snoring loudly in some cases, in others with very shallow respiration as in a profound sleep. From this comatose condition many cows never recover, while others have a period of wild excitement, throwing the head round, and injuring horns or other features, and making frantic but futile efforts to rise. The belly blows up, and the breathing becomes difficult in cases that linger, and congestion of the lungs often brings the end. There is a cessation of the digestive functions, and the comatose cow passes neither urine nor feces. Her horns are either hot or cold, and not of the normal temperature, and the legs are cold to the touch. The udder is distended and may or may not yield milk, but will not continue to secrete it, having been once stripped, after the attack has been fully developed. If the temperature is taken at the initial stage of excitement, it will be found slightly above normal, but it falls with the progress of the malady, and is subnormal before death occurs, unless this is caused by complications such as pneumonia. All these symptoms point to poison of the narcotic class, and the successful treatment discovered by Schmidt (of Kolding, Denmark) depends on the neutralization of this poison in the mammary glands. If enough has already entered the general circulation to paralyze the heart, the cow will die, but of this we can seldom make a guess. If we can arrest the supply, there is a good chance of recovery. What has been described above, is the course of a typically bad case, but there are many degrees between, and many disappointments for the doctor, who sees his patient recover consciousness, but succumb later to the pulmonary congestion already referred to. Milk-fever may occur within a few hours (I have seen it in two hours) after parturition, or be delayed until the tenth day, but no case is recorded as occurring later, and only a single instance of the latter is within the actual knowledge of the writer. As this occurred to the one cow kept by the then Principal of the London Royal Veterinary College for his own use, and some three hundred students saw her, there can be no doubt about it—neither could three hundred embryo doctors and a staff of professors save her life. Cows may go down with milk fever twice and even three times, and recover; a fact generally discredited among farmers, but witnessed by the present writer. Jerseys are the worst subjects, and such as have a relatively large butter yield to milk measurement.

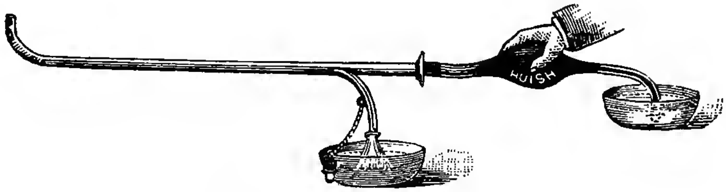

Fig. 22.—Milk-Fever Syringe.

Treatment.—This has been revolutionized by Schmidt, and improved upon. His plan was to inject a solution of iodide of potassium up the teats, dividing the dose between the four quarters. It was at once discovered that the majority of cases were saved, where previously about 85 or 90 per cent. died, but a considerable number suffered from garget or other udder troubles, and the milk secretion was hindered, if not seriously damaged, on account of septic germs gaining access in the course of injection. It was then found that the addition of an antiseptic through a syringe previously sterilized, obviated this risk, and a good working formula was published by the present writer, and is still a convenient one for farmers and others to use, who are away from professional aid, and are not possessed of the latest appliances. It consists of six drams of iodide of potassium, and half a dram of chinosol, in an eight ounce bottle of water, to be mixed with a quart of boiled (not boiling) water, and injected in equal parts into the quarters. This solution has the advantage that it will keep indefinitely and is always ready for use. The chinosol disinfects the inside of the instrument, and the precaution should be observed of inserting the metal end into the solution before inserting it in the teat. This also prepares it for pumping in air after the mixture has gone through. The teat is then compressed with the finger and thumb, or, better still, with the teat compressors shown in the illustration (Fig. 23A), and the udder mas-

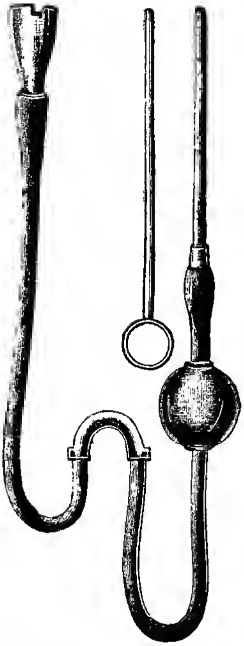

Fig. 23.—Milk-Fever Syringe for Liquids.

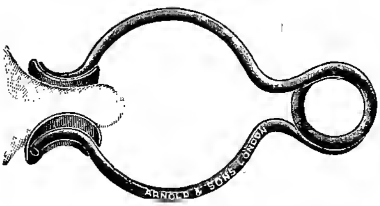

Fig. 23A.—Teat Compressor.

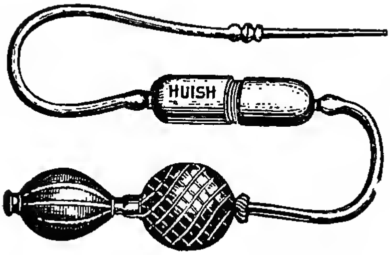

Fig. 24.—Milk-Fever Air-Pump (Sterilized).

saged with an oiled hand, to distribute the medicament, as well as the injected air throughout the gland. Whatever the toxin consists of, it would seem to have an avidity for oxygen, and by union with that element become harmless. Hence the advisability of pumping in air. The most successful treatment of all, is that of injecting pure oxygen, but for this a special apparatus is required (costing ten or fifteen dollars), and a screw bottle of oxygen specially constructed for the purpose. It is worth the outlay for a man with a valuable herd, familiar with the use of it and out of reach of a doctor. The remedy, whichever is decided on, should be promptly employed, and if the cow does not regain consciousness in six hours or less, it may be repeated. Either the air filter or the oxygen gas can be safely used at shorter intervals, and this is an advantage over the solution. Every encouragement should be given to a sick cow to rise, and a little help on head and tail will often decide her. She should not be allowed to remain a whole day on one side, but be turned over if unable to get up. Hand rubbing the limbs and cold swabbing the poll is also good, and for the latter purpose, pounded ice in a seed-bag strapped to the horns, is a convenient method of applying cold. The rectum should be unloaded with a greased hand, and if the cow was fully conscious when first observed, she should have received an aperient of oil or salts in a large volume of water. The unplugging of the rectum helps much, because the feeble action behind it may not be sufficient to expel hardened feces, and any movement in the bowels is a hopeful sign, as is the passing of urine. It is not necessary to use a catheter to empty the bladder unless the water has been long retained, because very little is secreted, as may be proved by using the instrument.

Convalescents should be kept in a quiet box, and if they recognize their offspring, after the nightmares they have passed through, they are benefited by the reawakening of the maternal instinct. If indifferent to the calf, it had better be taken away or the mother will only be bothered by it.

Latent tuberculosis may pass into the active or acute form as the result of this (or any other) serious illness.

Milk-Fever in Sows and Bitches.—Sows seldom go down with milk-fever in the manner described in cows, although some become more or less comatose, and stagger in walking. In their case it is a state more resembling the lumbago mentioned in connection with dropping before calving (which see, at page 224). A brisk aperient, and an injection per rectum, of warm soap and water, followed a few hours later by two or three ounces of neat glycerine, usually gives relief. The crouching and unwillingness to move, and refusal of food, which is often erroneously called milk-fever in sows, is due to inflammation of the womb, and accompanied by a high temperature; a symptom which distinguishes it from that malady. (See Inflammation of the Womb, at page 222.)

There is another trouble connected with milk secretion, which is also confused with milk-fever, and is not dependent on a toxin in the udder, but has a nervous origin caused by exhaustion of the vitality of the mother, through giving suck to too many young. Both sows and bitches are liable to it, and it comes at a time when the offspring are making the greatest demands. Eclampsia (see Nervous Diseases, page 149) is the name given to it. It is in the nature of a fit. The animal is found swaying, and with difficulty keeping her feet, puffing and blowing, and, if a sow, frothing at the mouth; if a bitch, with saliva dropping from it, as with a dog that has smelled something very disgusting. The eyes are bloodshot and standing out, the animal trembles, and is evidently greatly alarmed. She very likely fails to see, and may crush her young when she falls. The milk-supply suddenly ceases, or is much reduced.

Treatment consists in removing the cause, and some provision must be made in the way of a foster mother. An aperient and a sedative dose or two, and good living will generally put matters right. (See Fits, at page 148.)

Puerperal Mania.—Animals are occasionally attacked with brain symptoms of the opposite kind to those mentioned in milk-fever. In the latter, there is coma, or drowsiness, passing on to insensibility. In the malady now under consideration, frenzy or wild excitement is the result of the cerebral disturbance. (See Stomach Staggers, and Mad Staggers, at page 93.) Bleeding from the jugular vein and aperients usually effect a cure.

Parturient Laminitis.—Difficult parturitions are sometimes followed by acute inflammation of the sensitive laminæ of the feet, not differing from laminitis (described at page 349) in horses, but brought about by a sudden transference from the womb to the soft structures of the feet. This metastatic peculiarity has been referred to in connection with other abdominal troubles, as well as chest complaints. (For treatment, see Laminitis.)

Parturient Fever.—Instead of the acute form of inflammation of the womb or its sequel (the chronic described at page 222), animals sometimes take on a low septic continuous fever. A portion of decayed placenta may be the cause, or absorption of degraded tissues belonging to an injured womb. The symptoms are inappetence, dullness, moaning, grinding of the teeth, wasting, constipation, followed by a fetid diarrhea.

Treatment.—Washing out of the uterus with five per cent. carbolic lotions, the administration of quinine and vegetable tonics, and good nursing. (See Sick Nursing, at page 418; also, Laxative Foods.)

Garget, Mammitis, Mastitis, Caked Bag.—Inflamed udders, and such as refuse their office of giving milk, are among the many troubles of the cow-keeper. A book has been written by a Frenchman (Leblanc) dealing exclusively with the subject, and describing many pathological conditions, which cow-keepers lump together under the name of garget, or one of the synonyms given above. We may here consider some of the external and accidental interruptions to the flow of milk, and then the chief causes and varieties of garget. Injuries to the teats, whether by external violence in scrambling over fences, or by kicks, blows, thorns, biting by the young, injuries by the milker's heavy hand, eruptions, as those of cow-pox, or ripping of the teat in rising clumsily from the floor, when tied by too short a chain; these cause inflammation of the teat, swelling, pain, interrupted flow of milk, and either by retention of the dammed-up galactophorous sinus, as the funnel-shaped receptacle is called, or by invasion of inflammatory products from the teat to the gland within, result in mammitis. Little bodies called "peas" within the teat canal, act as obstructions and cause garget. These are not the little things they are generally considered, and the opportunity is taken here of calling them great things, and endeavoring to impress cow-keepers with their importance. So many cases of garget arise through neglect to deal with teat troubles.

Treatment of injured teats.—The importance of asepsis, or the use of antiseptics to prevent the entrance of disease germs, and of disinfectants to destroy them when they have gained admission, is elsewhere insisted on (see Antiseptics and Disinfectants, at page 410), but nowhere is the matter of greater importance than in the present connection. The slightest scratch, pimple, hardness or swelling of a cow's teat, should be at once taken in hand, and not left to chance. A bath is easily provided. All teat lotions mentioned later, should be applied in the manner of a bath. For slight injuries, a ten per cent. boracic acid, and seven per cent. glycerine lotion in water will be suitable, and will leave no taint to affect the milk, or be otherwise objectionable. A pickle bottle makes the best bath. The lotion will be put in it warm the first time, and may be warmed up again and again before taking it to the cow, and holding it up so as to immerse the teat, retaining it in this position long enough to thoroughly soak in. Most fluid applications for tests are mixed with glycerine, because it is desired that they should not quickly dry, nor should the teat be wiped, but a slight film of this emollient should be left after the aqueous portion has evaporated. The teat is thus largely protected against germs, and rendered supple. Where several applications will have to be made, a reserve bottle will be kept, with which to replenish the bath. It is one of the difficulties attending the treatment of injured teats, that the repairs effected by Nature are constantly broken down by the process of drawing the milk, whether by the young or by man's hand. The provision of an emollient and healer, then, is added to the antiseptic where any wound or abrasion is concerned. Wounds requiring stitches need very careful watching, and the use of the bath after every meal of milk has been taken.

Peas in the Teats.—These can generally be felt from the outside. They are often in the nature of warts with a narrow neck; a long enough one in many cases to permit of being pushed aside by an ordinary milk syphon, and their removal postponed until the cow is dry. If they occur early in the period of lactation, and cannot be thus dealt with, it is advisable to operate by means of a little instrument called a papillatome, or in the absence of this, an improvised tool may be fashioned out of a milk syphon with one side filed away so as to leave a cutting edge. Thus armed, and with the instrument boiled to render it aseptic, the operator seizes the teat in his left hand, and works the papillatome into contact with the pea. Holding the cutting edge firmly, and pressing the pea against it, he dissevers the obstructing body by a few deft turns in the canal. With a little manipulation, he will bring out the offending substance, or this may be accomplished when it has shrunken in a day or so, and while in the act of milking. After cutting it away in this manner, some of the boracic lotion previously mentioned should be syringed up and retained by a teat compressor, or a little rubber band, which must not be put on tightly.

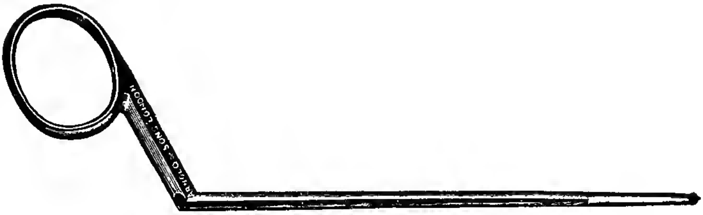

FIG. 25.—PAPILLATOME.

Not leading to garget, but causing loss and inconvenience, may be mentioned here sinus wounds, or permanent openings, left in the teat-wall through imperfect healing of wounds, or the embedding of a thistle-prick or tiny thorn, or clumsy operation upon warts. A puckered skin surrounds a tiny hole through which the milk leaks away, or squirts over the milker when the fluid is being drawn. Nothing can be done with these while the cow is in profit, but when dry the sinus should be slit open and explored to the bottom, and the offending materials removed. Whether any small foreign body is discovered or not, the whole surface of the wound must be scraped clean, and made to present a raw surface: none of the old pipe-lining or puckered mouth being left: then a fine suture or two, to bring the edges together, and a paint over all of carbolic collodion to protect from dirt and septic germs. If the operation has been properly performed, the union will be perfect, but if bungled there may be such contraction of the teat when the scar has formed, as to hinder the milk-flow when the udder again springs. There is practically no choice but to go on breeding from a good butter cow of the Jersey breed, but in the case of a shorthorn or other beef variety, it is often best to fatten off when milking trouble is of a permanent or recurring type.

Leaking Teats.—Such as leak from the ordinary channel have suffered some injury to the little muscular band whose office it is to close the orifice. The canal may have been roughly forced with a teat syphon too large, or a calf bite may have done irreparable injury. If the sphincter muscle is paralyzed, no treatment will cure it. If it has been bitten through, the union is fibrous and it is equally incurable. A temporary expedient to save leakage is a small rubber band put around the teat rather slack, after each meal has been drawn, but it needs judgment, or the filled teat will suffer too much pressure later on, when it is at its biggest, before milking time has come round. Overstocking leads to some of these teat troubles. It is cruel to the cow, and a trumpery sort of fraud to play off on a buyer.

Garget is frequently caused by exposure of a wet udder to a cold wind, and cows transported by sea and rail are very liable to get chilled, and suffer in this way. There is, too, a sympathetic garget, in which hardship is expressed in the sensitive udder. A frequent and unsuspected cause of garget, is the admission of filth germs through the open teat. The orifice is so small, that this means of infection is not thought of, but the opening is as big to a septic germ as a barn-door is to a bantam, and, moreover, the floor of every cow-shed is teeming with organisms of the kind. The sphincter muscle, which closes the teat, is relaxed by the milker, and if the cow lies down just after milking, she is offering facilities.

Symptoms.—The earliest are often not observed, although there is no disease of cattle in which the temperature runs up so high and in so short a time; as much as 111° Fahrenheit having been recorded, and 107° to 109° being by no means rare. With this rising temperature there is shivering, staring coat, and loss of appetite, but in most cow-sheds, the first thing noticed is a tender and swollen bag that will not yield milk. Then anybody can see what is the matter.

It may never go beyond the stage of congestion, and functional restoration may take place spontaneously. More often an acute inflammation follows, the cow is in great pain and shows it by grinding the teeth, rapid but shallow respiration, more or less straddling of the hind legs and a painful expression of countenance. An abscess may next form and eventually break if not lanced. In more severe cases, actual death of a large part of the gland occurs. A lead-colored line of demarcation gradually appears between the healthy and the diseased portions, and at this line separation finally takes place, the corrupt mass falling out and leaving a great raw cavity to be filled up by granulation. (See Wounds, at page 294.) This seldom occupies much time, and the animal begins to thrive as soon as the slough is got rid of. A cow with a lost quarter is depreciated in value, but often gives a fair quantity of milk. She had better lose the quarter in this way, than retain some focus of inflammation leading to attacks of garget at successive calvings. Garget, then, we have seen, arises from many preventable causes, but the ordinary cow-dealer and the buyer at depots cannot well protect himself from the infectious forms which are spread by cattle-trucks and boats, only so far as he can bring pressure to bear on the companies to carry out the State laws as to cleansing and disinfection, which are mostly good, but rarely regarded. Once get infection into a byre, and only the most strenuous work will get it out again. If it were very infectious—so much so that every in-contact cow got it quickly—the danger would be realized, but it is not. It is most irregular in its spread, first one cow getting a caked bag, then another, and likely enough at some distance from her but handled by the same man, and it is by his agency probably that it is spread rather than by aerial infection, although this is not proved. This common infectious mammitis is not distinguishable from ordinary garget, and cows suffer in very varying degrees. There is, however, an infectious garget on the Continent of Europe, which is of a very severe type, rapidly running on to decomposition and sloughing of the udder, and accompanied by much fever and bodily illness.

Treatment.—Whatever the cause, it is well to first administer an exceptionally bold purge, such as one to two ounces of aloes, an ounce of ginger and a pound of salts; the high temperature and constipation being early combated by the action of the drench. Much importance was formerly attached to rubbing in of liniments, often of a blistering or severe nature, but the writer's experience is quite opposed to their use. Fomentation with warm water, softening with melted lard (free of salt), and the massaging of the tender bag with an anodyne application, like camphorated oil or extract of belladonna, rubbed down with hot oil or melted lard. Our reliance should be placed in injecting the udder through the teat with a disinfectant that will come into direct contact with the inflamed gland and the septic matter, which has either entered or been evolved from the inflammatory process. For this purpose and for use in milk-fever (see Milk Fever, pp. 225, 226), every cow-keeper should have a proper syringe. They cost about $1.50 and answer many purposes if put away clean, and not allowed to get chilled in winter. A remedy at once antiseptic and soothing is a lotion of three parts chinosol, five parts glycerine, and eighty-two parts boiled water. This has proved of immediate benefit, and many cow-keepers employing it themselves, have told me that but two injections have sufficed to effect a cure. For what may be called the virulent infectious garget, still stronger measures must be taken, and no time must be lost in sending into the udder a solution of perchloride of mercury of the strength of one part in fifteen hundred. The curdles and varying matter in the udder during an attack of garget should be got away. Not by violence, but by patient and frequent efforts to strip, aided by the milk-syphon, which should be gently introduced, and as often as it gets choked it should be cleared with a fine wire. The syphon should be soaked in the lotion each time before using or else boiled; the latter being a recommendation for all occasions where a milk-syphon has to be used, as there is great danger of introducing septic germs and causing garget when the instrument is simply used for a quarter that won't run, or has a pea in it. (See Peas in the Teat, at page 232.) Every effort should be made to re-establish the secretion of normal milk, because mammitis so often leaves damage to the gland substance, or occlusion of some of the channels, and a dam is thus set up, or a focus for future inflammation, by the presence of some hardened products of inflammation. If when the subject of garget is again dry, the hand discovers kernels or hard lumps in the quarter, the animal is very likely to have trouble at her next calving, and the question of fatting off or retaining in the herd and taking the risk has to be considered. Do not use anybody's famous " oils " and add fuel to the fire.

What has been said of garget in the cow, applies in general to the mare, the ewe, and the sow, as well as the bitch, but in their case we are met with the difficulty of teats too small, as a rule, to pass a milk-syphon, and in the ewe as well as in the mare, we have but two glands, and the loss of one becomes more serious. The greater value of the offspring in the case of horses, makes the preservation of the udder in functional activity of paramount importance. Fortunately, in the case of the mare, her udder is less subject, by reason of its position, to septic influences from the soil or bedding, but bag troubles in the flock are even more numerous than in the dairy, and the greatest care in the disinfection of hands and clothes should be exercised. In the ewe, again, the tendency of what is apparently simple or accidental garget, is to take on an infectious character, and it is spread through the flock by the same man giving attention to the sick, and help to the newly yeaned in seeking the teat, or some attention to the ewe while cleansing. In the sow and bitch, the number of deals is a distinct advantage. They are, so to speak, in water-tight compartments, and the blocking of one or more may often be endured without serious detriment to the young. To all but the bitch, the carbolic preparations are suitable: they should not be employed on her, nor anything that she can lick off with danger to herself, for this is the accepted method of sanitation with bitches and cats. The latter are killed by very small doses of carbolic acid and external applications are readily absorbed with serious results.

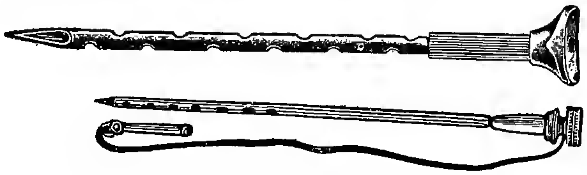
FIG. 26.—MILK SIPHONS, OR TEAT TUBES.

CHAPTER X

DEFECTS AND DISEASES OF THE NEW-BORN

Suspended Animation.—If a lecturer were to tell farmers that they sometimes kill their young stock before they are born, he would be put down as a romancist from the "disthressful" country of harps. Will the reader take it for a fact from an old hand at foaling and calving, lambing and farrowing, and on his assurance that he has resuscitated many himself? There is an interval between life in the womb and outside. The act of parturition interrupts the free circulation between mother and offspring, and the new arrival falls upon the floor helpless, and frequently covered with membrane, and his hitherto unused nostrils choke with slime. He is not born until he breathes. The mere fact of the new environment does not constitute life outside. There must be a quickening into this life by the action of the cold air plus the mother's lingual attentions on the skin. The beginner may take it from me that the freshly-dropped fetus will be stimulated by external cold, sooner than on a warm day and inside a building, and not hesitate to put a calf outside on a frosty night, while he clears the nostrils and slaps the youngster and perhaps blows down his nostril with a breath taken in and sent out in the shortest time possible (not the ordinary expired air, which is wanting in oxygen). The skin is endowed with numerous little cauliflower-like nerve ends, which receiving a violent impression from the outer air, convey it to the centers, and these responding to the stimulus, set the heart and breathing organs in motion. This accomplished, the new-born may be brought indoors again, and his natural heat conserved; besides which the dam will in ordinary circumstances be anxious to lick him clean, and this process further helps the newly-acquired functions. I have heard experienced men say "he is dead" when the new arrival has remained limp upon the ground, with his head in a gutter full of urine and liquor amnii, and proceed to give attention to the mother. Worse still, I have seen double-backed necks, and the youngster left in a corner and even dragged out upon a dunghill. It was one such instance as the last, during my early days, that led to my persistent use of artificial respiration, and the present insistence on the fact that many animals are sacrificed unnecessarily. One should give the new-born just such attentions as are recommended for the apparently drowned, and a considerable percentage will respond quite a long time after the average stud-groom and cattleman have given them up as dead as a door-nail. Do not give stimulants, which will be more likely to choke than to enliven, but persist in working the forearms upon the chest in regular rhythmic movements, and if an assistant is present let him slap and rub and blow in the face of the subject.

Not Sucking.—Another source of loss is the inability of the youngster to get his first taste of mother's milk. He may be unable to get upon his feet, and tumbles about and seems exhausted, but these clumsy efforts are positively good for him up to the point of ultimate and complete failure. With each fall, the bow-legged colt and the tottering calf knocks out some of the residual air, and opens his pipes the better. It is only when there seems a bad prospect of his getting to the teat that we should help him. By partly supporting his swaying body, and directing his head, we may help him to get that first suck which will encourage him through all future difficulties to persist in getting what he wants. It cements the bond between the mother and the young, and is specially important in mares and heifers with their first-born, for whom they may have no love until the sensation of being sucked acts through the nervous system upon the womb, in aiding its contractions, and through the brain, in awakening the maternal instinct. The filly and the heifer which to-day have to be coerced into allowing their young to suckle, will to-morrow challenge the approach of the nurse, and jealously guard their offspring. The person attending upon mare or cow should not leave them until the first suck has been taken. In the case of sows, the weaklings should be given the best deals even if they fail to retain possession afterwards. It is important to see that there are enough teats, as a farrow will do badly that has to take turns at the maternal bottle. Better to take away the least promising members and bring them up by hand.

All may have gone well, and a sturdy youngster on his feet may be denied his nourishment by the dam having some udder trouble. (See Garget, etc., in previous chapter.) In addition to such causes, there are mares and heifers that are intensely sensitive about the sides of the belly. Stablemen know the difficulty of grooming a ticklish mare, and these are truly ticklish subjects; they are irritated and frightened by the rough usage of the new-born, which, of course, have no thought for anything but their own gratification.

We have seen valuable colts killed by a cow-kick from fidgety mares, and calves starving and afraid to approach a heifer that has borne them. It is our business to effect a reconciliation by force or by fraud, or else provide for the unloved in some other way. The broken-in filly and the mare accustomed to discipline will submit to be fastened by the head, and a front foot held up by one man, while another guides and protects the foal in his attempts to suck. If this is done a few times, the fidgety one soon outgrows the objection and in many cases becomes a fond and jealous parent. Anointing the udder and flank with olive oil will sometimes help the mare to overcome her ticklishness.

Orphan Rearing.—The management of orphans calls for remark by one who has at some time or other been a foster-parent to all sorts of animals, from blind squirrels to foals. First, it should be said that horse-breeders ought to be in touch with one another, and make arrangements before the foaling season for an exchange of foster-mothers.

It often happens that a mare loses her foal and is swamped with milk, and on the next holding another mare has died and there is no provision for the orphan. Neither man knows of the other's loss until they meet at market, some time after they could have mutually helped one another. It is a cheap form of insurance to make the offer beforehand, for neither knows his luck, and both feel bound in honor to give aid and comfort to the orphan when their word has been given. In a breeding district where I attended many such cases, the office of intermediary occurred to me, and became established, to the permanent benefit of the district. The owners may both be willing, but we have to get the consent of a third party. The mare will nearly always object if she knows, and she nearly always does know. We may use force successfully, but a mixture of force and guile is a better prescription, and we should do it under cover of darkness, real or artificial. The mare should be placed in a stall, not a loose box where she can swing round. Two men, or, better, three, should be engaged in the deception: one at the head with a blinder over her face, one to hold up a front leg, and another to introduce the little stranger. The men chirrup to the mare and assure her that nothing harmful is going to happen, exercising all those horsy endearments which need not be described, and including the smell of some oil of aniseed, or oil of rhodium if obtainable, upon their hands and smeared upon the orphan. Most horses are very fond of this odor, and if not specially attracted by it their olfactory nerves become so impregnated, that they are less likely to discover the individual odor of the foal (every young creature is recognized by its smell, as one must be convinced as a mere onlooker into the lambing-pen), and when a suck has been secured and the probably hungry youngster is somewhat reassured, he may be passed round the mare for her to smell if not see, while her attendants still have control. It is not safe at once to leave the pair together, but the foal may be put the other side of a fence while the mare's udder is filling to a degree that makes her unconsciously willing to give suck. Each succeeding performance will be more lasting, and the degree of restraint less, until a permanent friendship is established.

If a foster-parent cannot be had, we need not despair of rearing orphans. As one who has been successful in this interesting but somewhat troublesome business, I would point out a few matters of importance. If the foal has had no milk whatever from its dam, it has missed the natural aperient which occurs in the first period of lactation, and should be given a dose of castor-oil. Then our food must approximate to that of the mare's milk. It will be seen from the appended table that the milk of the mare contains the least fat. To balance the milk of the cow we must dilute it with water, and make up for the loss of sugar by adding some. The milk of a fresh calver should be used; not a butter-cow of the Jersey type, but a shorthorn or cross-bred animal. To this should be added 25 per cent. of boiled or distilled water, a fortieth part of milk-sugar (most druggists stock this article), and a hundredth part of lime-water. Cane or beet sugar can be used, but is not so desirable as sugar of milk. Success very much depends upon giving food in small quantities, and frequently. It is natural for young creatures to suck, and sleep, and play at frequent intervals, and he who would rear a colt by hand must be prepared to feed it very late at night; at least once during the night, and be no lie-a-bed in the morning. At first, no more than a pint at a meal is desirable. Roughly reckoned, the proportions may be as follows:—half an ounce of sugar of milk dissolved in a gill of hot water, three-quarters of a pint of milk, and a teaspoonful of lime-water. As time goes on, the foal will take rather larger quantities and at longer intervals, but the pot-bellies carried by hand-reared colts are very much due to the practice of giving them too much at a time. The rearing of calves on other cows' milk, is a world-wide custom, and scour, a frequent result of mismanagement. (See Scour, at page 109.)

As the ewe's milk is the richest in fat, hob lambs should have linseed gruel added, or those supplementary foods referred to elsewhere. The reader with an orphan puppy or other animal on his hands, should consult the table of milks, and endeavor to provide a substitute on the plan indicated above.

COMPOSITION OF MILKS.

Constituents.	Woman.	Cow.	Goat.	Sheep.	Mare.	Ass.
Water	87.38	87.60	87.30	81.30	91.00	89.63
Fat	3.80	2.20	4.40	7.50	0.55	1.50
Casein	0.34	3.00	3.50	4.00	0.78	0.60
Albumen	1.30	1.20	1.35	1.70	1.40	1.35
Sugar	7.00	4.70	3.10	4.30	5.50	6.40
Salts	0.18	0.70	0.35	0.90	0.40	0.32

The above table was compiled by Doyere, and it will be noted that the percentage of fat is rather low, and represents the average unimproved breeds of France, not the butter-breeds. In Great Britain, a three per cent. standard is required of milk-vendors, but this is considered unreasonably high, and can only be maintained by keeping a Jersey or two in the herd to bring up the amount.

It will be seen that the milk of woman and our friend the cow are very near in composition, which is fortunate for our babies who take to it so readily and usually thrive upon it. It is rather remarkable, too, that the mortality in Great Britain from tuberculosis has fallen by forty per cent. since mothers generally declined to suckle their children, and relegated the function to the much suspected cow. This does not positively prove that tuberculosis is not conveyed to infants by cows' milk. Calves and pigs have been easily infected by milk from tuberculous cows in the generalized form of that malady, as well as in the udder, and the various Commissions have come to the unanimous opinion that the cow is the chief source of infantile tuberculosis, which generally affects the intestinal glands, the mesentery, or the meninges of the brain (tubercular meningitis). I have seen many infants tossing to and fro with the latter, and it is a sight to make a stone statue weep.

If the value of milk is judged by its fixed constituents, we may accept Colin's classification in the following decreasing order:—

Bitch.
Ewe.
Goat.
Sow.
Cow.
Camel.
Woman.
Ass.
Mare.

Those persons who rear young animals, those in particular who purchase in order to make use of cows or other animals with milk should bear in mind the difference in the proportion of the various constituents at early, middle, and late periods, and not put a freshly-dropped calf on a stale milker, or late weaned lamb on a ewe that has lost her own at a month old. The following table of ewe's milk at three and six weeks after yeaning will best illustrate my meaning:—

	Ewe's Milk three weeks after lambing	Ewe's Milk six weeks after lambing
Water	75.00	86.70
Fat	12.78	3.67
Casein	6.58	4.44
Milk Sugar	4.66	4.00
Mineral Matters (Ash)	.98	1.19
	100.00	100.00

Here will be seen a difference, roughly stated, of ten per cent. of water and nine per cent. of fat and two per cent. of casein; quite a different milk, in fact.

Constipation of the New-Born.—From absence of sufficient colostrum in the milk, insufficient quantity, inability to suck, or any of those diseases of the maternal gland referred to under the title of garget, the young creature may be unable to unload the rectum. It is usual for the foal and calf, and short-legged animals to a lesser degree, to experience some difficulty in exercising this function for the first time. They have to learn how to assume a convenient posture and fix the diaphragm (see Parturition, pp. 200, 208), and being but indifferently established upon their feet, find it difficult to maintain their equilibrium. The rectum is filled with a rather hard plug of yellow material that has accumulated during uterine life, and requires an effort to expel it. If after several attempts the young creature fails, the person in attendance should give assistance. This may take the form of introducing an oiled finger, the injection of a little sweet oil or glycerine from a suitable syringe, or a warm soap and water clyster sent in by an ordinary household enema. It is better to release the accumulated fecal matter in this way than to give aperients, unless there is reason to suppose that the animal has not taken the natural aperient. The orphaned at birth should have a small dose of castor-oil mixed with milk, when it may be expected to have the desired effect, without provoking griping pains on the very threshold of life, or establishing the necessity of further laxatives.

Soft Feet and Deformity.—If the under surface of the foal's foot is examined at birth, it will be seen to consist of yellow horn fibers, as yet soft, and unfitted to bear pressure. We have known this trimmed off, and warn readers to do nothing of the kind. Evaporation consolidates it. In those prematurely born, this sponginess is the more marked. What we may do to help conformation, and prevent deformity, is to take care that the youngster stands upon a level floor, and not upon rocks and lumps, which give the tender structures an inclination to one side, and throw out the column of bones of the leg, thereby altering the center of gravity. To such slight influences in the first few days of life are many permanent deformities due; irreparable later on.

Leaking Navel. Pervious Urachus.—In the womb, the bladder is connected with the navel-string by a canal through it, and the urine passes out into the water-bag and adds to its bulk. Its mission is fulfilled at birth, when the stream should pass out through the urethra of the penis, or by way of the vagina in females. This canal (urachus) blocks up and assumes the condition of a solid cord, and eventually is reduced to very small proportions. Notwithstanding the acceptance of office by the urethral canal in the new-born, the old canal sometimes remains imperfectly closed, or leaks urine. Horse-foals, mules, and asses, are more subject to this imperfection than ruminants, but it is by no means rare in bull-calves, and a few heifers are troubled by it. When this condition is discovered, a few days should be allowed for Nature to complete the work, before resorting to curative measures. Before doing so, it is important to observe if any urine is passed the proper way, as in rare instances there is no new exit, and to stop the old, is to kill the animal by the filling up of the bladder, and subsequent rupture or inflammation.

Treatment consists in securing the open mouth of the urachus, and putting a ligature upon it. There is seldom any difficulty in discovering it, as the parts project, but should they not do so, a stout needle such as carpet-makers employ should be used to lift the part, to enable the operator to put on a waxed end, or suitable thickness of twine, tying it in a doctor's knot that will not relax or come off. It should be just tight enough to make leakage impossible, but not as one would ligature a wart, or the same result will be attained of destroying the structure constricted. Another plan is to pass two sharpened skewers through the prominent navel, in the form of a cross, and around these, wind a figure of eight, consisting of thread, string, or fine, tarred cord, in order to obtain the necessary pressure. A mild degree of inflammation is thus locally set up, with the result that adhesions form, and permanently stop the leak. In some cases where the navel has been broken off short, or the urachus cannot be picked up, a blister extending for some distance around the umbilicus will serve the purpose of causing a swelling that temporarily occludes the orifice, and by the thickening process following on the inflammation, seals the tube. Yet another method, and a simple one, is to touch the soft moist parts daily with copper sulphate, and cause its shrinkage. Nitrate of silver is still better for the purpose.

Enlarged or Ruptured Navel. Umbilical Hernia.—Another navel trouble is caused by imperfect closure of the aperture which existed in uterine life. A bulge is seen of varying dimensions. The animal should be cast, and secured upon his back in order to make a proper examination. It will generally be found quite easy to push the mass within the abdomen. It will come out again immediately. What you have to ascertain is, what does the tumor consist of? Is it belly fat (omentum) or gut, or some of each? Upon the examiner's decision will depend the treatment, to a great extent. It may be easily cured, or the animal may be killed by enclosing a portion of intestine in a trap or ligature.

If it is all omentum, it will feel like dough when compressed between the fingers. If it is gut, it will be easily collapsible, and impart a sensation to the fingers as of gas being squeezed out. If there is but a small knuckle of intestine, together with omentum, there will be an uneven degree of hardness, and it will not be a fit subject for the simpler operation about to be described. If the skin can be pinched up free of the contents of the sac although intestine, we may put on a ligature. The one danger is that of enclosing a piece of gut.

Treatment.—Cast the animal, and secure upon his back. Gather up the skin free of viscera or omentum, and push skewers through transversely, and wind round twine in the form of a figure of eight, or simply a strong tie of string that will not give out or slack away. The simple tie has the disadvantage of less resistance below, after two or three days, and there is a risk of its coming away before its mission is fulfilled. The skewer trick is a pretty sure one, and readjustment is easy, if seen to be required. Quite a number of ways are practised to cure umbilical hernia. There is a most useful instrument called a clam or clamp, in fact a variety of these are made in wood and metal, with screws and without. Those composed of aluminum have the advantage of being light in weight, and not disposed to oxidation like steel, or to break or slip as do wooden ones occasionally. (See Illustrations.)

The degree of pressure can be regulated by the screw, but there is just one disadvantage that the instrument may be torn off in going over a fence, or through scrub. We have supposed a simple case, but a hernia consisting of gut and omentum and attached to the skin and cord, must be dealt with by other means. A surgeon will prefer the knife. The prepared animal secured, and preferably under chloroform, can be easily operated upon by one with any skill. If the skin is divided by a knife whose sharp edge is always held upward, there is no risk of wounding the gut. Then, when the contents of the sac are exposed to view, it will be found quite a simple matter to separate the bowel from the omentum, and push it back into the abdomen. It may be desirable to pull the omentum in two or three directions, so that it may not immediately assume its former relation to the bowel, but speaking with experience of many cases, I have never known a fresh entanglement. The lips of the surgical wound should be sutured, as an extra safeguard, but this is not absolutely necessary if a clamp is put on the now loose portion of skin, or the skewers or the overall ligature employed. The hands, and all implements used, should be rendered aseptic before commencing the operation, and there is then nothing to fear. The Westerner, and such as can neither obtain professional aid nor use a knife in the manner described, may act on the ancient principle known to the Romans, and touch the skin at spots an inch or less apart, with a glass rod dipped in nitric acid. The effect of this is to produce subcutaneous inflammation, as well as more or less death of skin, and

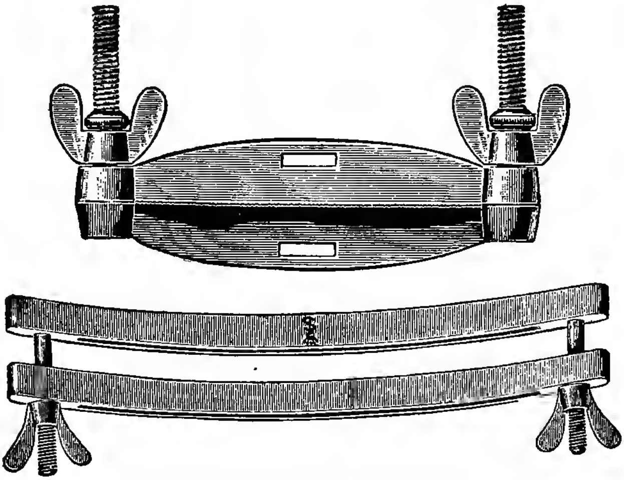

FIG. 27.—UMBILICAL HERNIA CLAMPS.

such contraction of the common integument as to press in the tumor, and shrink the whole region around the sac, and as a rule reduce the hernia, if not absolutely cure it. It is a crude method but a fairly successful one, and can hardly be called up-to-date, as it was practised in Europe 2,000 years ago. Celsus in the second century A. D. recommended sulphuric acid (oil of vitriol). This acts in the same way as nitric acid.

We have mentioned some of the principal means adopted to reduce umbilical hernia, but an important thing remains to be said, namely, that many ruptures are self-cured by simply letting them alone. It is a portion of the small intestine, which rests upon the floor of the abdomen, and extrudes through the umbilicus in rupture, and in course of time, when the suckler begins to take other food, this part of the bowel is withdrawn into the flank and the large bowel takes its place and is not disposed in the same measure to break bounds. Between the natural action of closure of the ring, and the removal of the gut, the tumor is often much reduced: in many cases wholly before the next spring. It is therefore as well to leave the question open until next year, unless we find in the fall that the rupture is disposed to remain quite as large, or even increase. Then we had better operate before winter begins. In case of a fatal accident, the animal will not have to be kept through the winter, and the fly season will be avoided if we are too busy with the plow in the spring.

Navel Ill, or Inflammation of the Navel String.—By navel ill is generally meant septic infection through and extending up to the liver, and from thence poisoning the system. The vein may be found blocked with a decomposing clot (see Embolism, Chap. II) and the navel swollen. This unfortunately is seldom observed until the animal is already so ill as to neglect the teat, and be constantly lying upon the ground. A large, soft mass marks the site of what should be a withering cord, nearly or quite ready to be detached by the first contact with a bush or other trifling obstacle, and from it, a variable and unhealthy discharge is poured. Fever runs high, and there is constipation followed by diarrhea, shallow but rapid breathing a clammy, dry mouth, sunken eye, diminished secretion of urine, which is high-colored, and visible membranes stained as in jaundice. This disease is a preventable one, and does not often occur in lambs yeaned outdoors, but happens to foals and calves most frequently when confined on stale bedding and dirty floors, for it is a dirt disease; the germs enter the open umbilicus and rapidly multiply, bringing about the state above described. Tying and dressing the navel at birth is an almost certain preventive. (See Navel Treatment for White Skit, or Scour, and Joint Ill, at pages 109, 110, and below.)

Treatment.—The only hope of success lies in neutralizing the septic matter by injections of disinfecting substances. Armed with a syringe and five per cent. carbolic lotion, the vein should be sought, and the fluid gently pressed into it: repeating the operation twice daily. Chinosol of the three per cent. strength in warm water is a good dressing, and may be used for bitches, where carbolic is inadmissible. The region of the swelling should be anointed with an ointment of the same kind. The high temperature may be combated by dosing with salicylate of sodium and the prostration by quinine, gentian, iron or other tonics. (See Table of Doses, 231-233.)

A few animals of exceptional constitutional powers will survive, but it is a terribly fatal malady, and should be prevented.

Joint Ill.—A specific inflammation of joints in the very young, due to the entrance through the open navel of germs of the same kind, if not identical with those causing infectious scour, or white skit (which see, at page 109). Ushered in by febrile symptoms, loss of appetite, dullness, pen-feathering of the coat, or staring, as it is called, lying about instead of playing in the usual way, then lameness or stiffness, swelling of the joints, and later the formation of pus within them. There is always much suffering where articular surfaces are inflamed, and the subjects of joint ill are pitiable objects, whose owners sooner or later are constrained to kill, rather than be constantly reminded of their condition, by viewing them crippling around and reflecting on the prosperity of the farm, not to say the management of stock. A few of the more robust eventually recover unaided, and some are helped by good nursing and tonics, while the most successful local treatment has been that of puncturing the skin at several points in the neighborhood of the joint (not the joint itself), and injecting a four per cent. solution of formalin.

This neutralizes the poison and is worth trying, and incurring some risk too in very bad cases, as the animal will almost certainly die or be killed, and such are the instances in which we may adopt " kill or cure " tactics.

Tongue Tie.—The new-born are sometimes unable to suck, on account of the imperfect mobility of the tongue, which cannot be adapted to the teat. If examined on the under surface, the frenum or bridle, as the attachment to the floor of the mouth is called, is too short, and confines the organ or restricts it more or less.

This defect is easily remedied by cutting the frenum. A little blood is liberated, but healing soon takes place, and no subsequent treatment is required. The hungry youngster will often begin to make use of his new-found freedom before the taste of blood is out of his mouth.

It is just one of those little matters that need looking to; one of those cases where " the master's eye does more work than both his hands." He may have to put up with greenhorns for manual labor, and, however well-disposed, they are often so ignorant of animals, that they will pass a fat sheep on its back, and think it is enjoying a roll on the ground like a dog, or a horse after a day in the shafts; not dreaming that the animal's life will be lost for want of turning.

CHAPTER XI

DISEASES OF THE SKIN

These may come from within or without, and some of those to be considered in this chapter might be as appropriately considered under constitutional or specific diseases, since they are surface manifestations of maladies affecting the blood. Such eruptions as eczema and the various pocks come from within. Those induced by outward circumstances are chiefly parasitic. In order to understand some of the eruptive skin diseases the student should keep in mind the fact that the skin willingly undertakes vicarious functions and relieves the kidneys and liver, when they fail in their allotted tasks of separating certain constituents from the blood circulating in them. (See Inflammation of the Kidneys and Uriniferous Sweats, at page 138.)

When the skin is trying to pass out waste tissues that should have been excreted by the kidney, irritation is set up in the glands, and that common symptom of all skin diseases—itching, the lesions discovered after the patient has indulged in a good rub being in the nature of injuries by violence, not specific eruptions like the vesicles of eczema or the pustules of sheep-pox. Any disposition to rub or scratch, on the part of an animal, calls for investigation. Great volumes have been written on skin diseases, but despite our accumulation of knowledge of the subject, we meet with cases of persistent itching, the cause of which cannot be discovered nor a successful remedy applied. This is notably the case with dogs. Ladies' pets indulging in good living, and taking insufficient exercise, develop a dryness of the skin which provokes itching, and presently becomes a habit and an amusement. There are cases of the kind among animals that are not so treated, which come under no denomination, and over which old-fashioned writers passed as over thin ice, calling it a cutaneous furore, and apparently satisfied with having discovered an expression at once forcible and semi-scientific. Moderns substitute the term cutaneous neuritis. The undistinguished scribe in the present work prefers to confess ignorance—blank ignorance—as to the conditions which cause perpetual itching without any change in the skin that cannot be detected by any known method of diagnosis.

Many of the names given to skin diseases are confusing to beginners and only serve the epidemiologist to mark fine distinctions, or describe various periods (see Cow-pox) in the progress of a malady. To such of us as know "but little Latin and less Greek," they are not so explanatory as to a professor of languages.

Inter alia, one may say that the insistence on the part of universities and veterinary schools on a good matriculation examination for entrants is not the result of a conspiracy to keep out bright lads who have not enjoyed a liberal education, but desired as test of their fitness to learn and a proof of their possession of such preliminary knowledge as will enable them to understand technical terms. The language of science is a common one to all peoples, and the tongue-twisters abhorred of the freshman explain themselves to such as are well grounded in the classics. It may serve a useful purpose to briefly mention some of the conditions of the skin described as separate diseases in medical works, but not of any great practical importance to stock-owners treating their own beasts. We will take the *arrangement* of Professor Axe in his great book "The Horse" (in which it was my privilege to assist him).

With reference to diagnosis, the late Professor says:—

"To arrive at a correct conclusion as to the nature of any form of skin disease, the examiner must be armed with practical knowledge of the various types in which eruptive affections are exhibited, the course which the particular eruption follows, and its probable termination; and particularly is it essential that he should know whether the affection is acute or chronic, and whether it is a kind which comes under the heading of periodicity; and whether it is associated with any form of specific fever. In cases of diseases of the skin which are not attended at the time of the examination with any kind of eruption, the general condition of the animal and any change in the color of the skin have to be noted in order that an opinion may be formed as to the probability of an eruption appearing as the disease advances. In short, it is most important to determine by critical examination the exact nature of what are called by pathologists elementary lesions, all of which are distinguished by certain terms. For example, when the skin is discolored by some alteration in the quantity or arrangement in the coloring material as the result of the irritating action of parasites, or by chemical agents, the term *macula* is applied to the discolored patches. Stains which are due to the escape of blood from the vessels of the skin are designated *purpura*, and are therefore excluded from the designation *macula.*

Erythema means a redness of the skin arising from a determination of blood to a part. The appearance itself is easily recognized, but taken alone it does not indicate the particular disease out of which it arises, as it may depend upon a variety of causes.

Wheals.—This term is used to indicate certain elevations of the surface of the skin, the center of which presents a pale color, having the appearance produced by the sting of the nettle. Wheals are caused by sudden dilatation of the blood-vessels, followed by the escape of fluid from them into the center of the swelling. These appearances, however, are not generally recognizable in the horse, owing to the color of the skin and the covering of hair.

Papules, meaning pimples, are of various kinds, ranging from minute specks due to excess of blood in the papillæ of the skin, to the larger elevations caused by distention of the follicles, or by the deposition of lymph around them, or by solid deposits in the true skin. There are also papules or pimples formed by the collection of sebaceous secretion within the follicles, and others resulting from hypertrophy or overgrowth of normal structure forming minute fibrous excrescences or small warts.

Vesicles are really small bladders or blisters containing a watery fluid; they naturally vary in size according to the amount of fluid which they contain. When the bladders are sufficiently extensive to be described as large bladders they are termed bullæ; thus as the result of an ordinary blister, large and small water bladders, otherwise vesicles and bullæ, will easily be distinguished.

Pustules.—These elevations are distinguished from vesicles by their contents. While the vesicle contains clear, watery fluid, the pustules always contain pus, and the result of more active inflammation than occurs in simple vesicular eruption. Vesicles in some diseases become converted into pustules as a consequence of more intense inflammation arising in the course of the ailment.

Squamæ.—The word is used to indicate scales, which are obvious enough on a mere cursory examination. A scaly condition of the skin may be an accidental condition, and simply denote want of cleanliness, or it may be an indication of irritation of the surface, or the outcome of some specific disorder.

Pityriasis, or bran disease, is not uncommon in the horse, and is a good illustration of the condition of skin which is described as squamous.

Tubercula are small lumps or large pimples which are hard and circumscribed, and are commonly permanent. Occasionally they undergo slow suppuration, but ordinarily remain as small fibrous tumors which are of no special significance, unless they occur on parts of the body with which the harness is brought into contact, as on the shoulders and back.

Besides these changes in the skin which have been described, there are to be found crusts or scabs which consist of the dried exudation matter discharged from a broken surface. They vary in their appearance according to the character of the discharge, to the drying of which they owe their origin.

Ulcers are well known as complications in certain forms of skin disease. They consist really in destruction of the tissues of the true skin, arising either from simple inflammation or from a specific disease, as in glanders.

Excoriations are those superficial injuries due to the removal of the cuticle by friction between two surfaces of the skin, or by the act of rubbing, biting or scratching to relieve itching, or from the pressure of harness.

Having satisfied himself as to the existence of one or more of these morbid conditions, the examiner is in a position to make a preliminary diagnosis, possibly to form also a prognosis, and to arrive at some conclusion as to the cause of the disease and the principles of treatment.

Pocks or Pox. Vaccinia.—There is a horse, a cow, and sheep pox: each peculiar to its own species. The first is rarely met with and is of no great importance. Cow-pox has a special interest for human beings because of its relation to small-pox and vaccination. It is not necessary, in a veterinary work for stock-owners as this is intended to be, to enter minutely into the vaccination controversy: suffice it to say that when small-pox raged in Britain, it was found that milkers and others who had suffered from cow-pox escaped the more serious malady, and that Jenner, observing this fact, set about inoculating human subjects, and proved to his own satisfaction that an immunity from small-pox might be thus acquired. His opponents denied it. Some declared that the disease he inoculated was horse-pox, and others, the malady known as grease. (See Grease, at page 261.) It is now pretty generally agreed by all civilized peoples that vaccination confers a large measure of immunity, and modifies the virulence of such cases as it fails to prevent. The statistics of small-pox hospitals may be taken to prove this. A later generation rebelled against vaccination, because the arm-to-arm practice might, and perhaps did, communicate other diseases. The outcome of the agitation was good.

The British authorities, under the auspices of the Army Veterinary Department, set up a calf-lymph establishment, from whence pure vaccine was supplied to medical practitioners, free from suspicion of human contamination. This example has been very generally followed by other nations, and the quarrel has died down.

Cow-pox is a mild infectious disease; " benign " is the technical term for it, but this does not mean that it's so sweet as to be something desirable, but the opposite of malignant. The variolous diseases are of extreme interest, and readers who desire to study them are referred to Hayes' translation of Friedberger and Frohner's Veterinary Pathology. Cow-pox often occurs when infants on farm premises are vaccinated, and their mothers or nurses are engaged among the cows. When cows suffer from cow-pox their attendants are liable to contract the malady. " Cow-pox can be transmitted to sheep, goats, horses, and men; and human variola and vaccinia to cattle " (Friedberger and Frohner).

Symptoms of Cow-pox.—There is but slight elevation of temperature, and this is seldom observed. The eruption appears on the teats and that part of the udder immediately above them. The cow is often noted to fall off a little in milk, but this is not a constant symptom, so little is the constitutional disturbance. The teats are tender and swollen, and red pimples appear, varying in size. The pimples rise and fill with a semi-transparent fluid but have a depression in the center. This fluid changes into pus-like matter, after which it turns brown and forms a shining crust which drops away in about four days and leaves a scar (cicatrix). This is what happens to such as are not broken by the milker. From first to last a period of about three weeks is covered, but where the vesicles or pustules are ruptured, healing is delayed and ulcerous sores need treatment.

The disease in the cow is so benign as to seldom call for medication, but is of much importance to the milk-vendor, because all up-to-date retailers insist in their contracts that notification shall be made, and no milk supplied from cows affected with the disease.

An outbreak of a very mild disease may therefore entail very serious loss on the producer. On the slightest suspicion of a pimple, a cow should be removed from the herd and kept under observation, and not allowed to associate with others for a clear three weeks if the characteristic variolous eruption develops. Broken pimples and sore teats should receive a bath of glycerine and boracic acid as advised in connection with sore teats. (See Garget and Teat Troubles, at page 231.)

Horse-Pox.—A few vesicles developing into papules and undergoing the same development—papulation, vesication, pustulation, desquamation and resolution—may be found about the pasterns, and the disease is infectious as between horses, but as stated at the beginning of this article, is so rare as to be known but to a few veterinarians. If discovered, the same measures of isolation as recommended for cows are advised, and avoidance of the brushes or tools employed upon the sick when attending to other horses.

Sheep-Pox.—The variola of sheep is of greater importance to the flock-master than is cow-pox to the dairyman, because occurring as an epizoötic, and spreading with great rapidity. The contagion of cow-pox is a fixed one, and must be conferred on man by actual contact. That of the sheep is volatile as well as fixed, and retains its infective power in buildings for as long as five and six months. In the " person " of the sheep recovered from the disease, its infectivity is retained for six weeks. It does not lose its virulence in twenty degrees of frost. Its spread occurs by intermediate bearers as well as by contact of one sheep with another: hence it is dangerous for a shepherd to pass from an infected farm to another; sheep-dogs may be the means of conveying the malady. Clothes, wool, skins, fodder, and manure will carry it, and railway-trucks, and ships or other vehicles. It is transmissible to man, goat, ox, horse, and pig, either naturally or by inoculation.

On the Continent of Europe serious losses are entertained. Seldom indeed does it cross to the neighboring island of Great Britain. The conditions under which sheep are kept in Australia and South America are such as to make its introduction or spread extremely unlikely. The writer has not met with it in the United States. Infected buildings can be rendered safe by disinfection with a one and a half per cent. hydrochloric acid mixture or five per cent. carbolic acid, but ten per cent. of permanganate of potash is needed. The latter in such proportions is too expensive for application to ordinary farm buildings, and the preference should be given to the first acid named.

Symptoms.—There is a variable period of incubation: the shortest being two days, and the longest seven: an average being four to six, when the animal has shivering fits, and shows a temperature per rectum of 106° to 108° Fahr. He ceases to feed and chew the cud, hangs his head, is greatly depressed, and loses strength. A little discharge takes place from the eyes and nose, and the conjunctival membranes are reddened and the vessels standing out (injected, as it is said). The eruption occurs upon the parts that are bare or least covered with wool, as the thighs, under the arms, and about the mouth, nostrils, and around the eyes, under the tail, and along the belly and chest. The exanthema is sometimes seen inside the mouth and on parts of the body covered by wool. When about the fifth day the pimples have a red ring around the base, they grow pale on the top, and if clusters occur about the head much swelling accompanies their development. With the development of the vesicle the bodily temperature falls, the contents change in color, assuming an orange tint, and are fully ripe on the sixth or seventh day, then a turbidity precedes their conversion into pus and renewed fever, which is now of a catarrhal type involving the eyes, respiratory membranes and those of the pharynx, and a mixed discharge of mucus and pus (muco-purulent) comes from the eyes and nostrils. Breathing and swallowing are rendered difficult, and sleep is well-nigh impossible. Great swelling of the head, diarrhea and a horrible smell from the skin are frequent symptoms at this stage, which precedes the final drying off of the pustules, the contraction of the skin, falling off of the crusts or scabs, which pass from yellow to brown, and the cicatrization or scarring over the integument. This is the ordinary course the disease runs, and it occupies about thirty days. It will be seen by the reader who has perused our remarks on cow-pox that the variola of the sheep is a very much more serious affair.

Treatment.—The difficulty of medicating numbers and the failure of all measures in curtailing the duration or even severity of the attack, deters us from attempting it. The man with a half dozen ewes, in a shed, may ameliorate their condition somewhat, by attention to such details as will add to their comfort, and by providing special foods, removing the discharges, etc., but the great thing is prevention. Instant isolation of suspects, disinfection, and the avoidance of any traffic between the sick and the sound.

Eczema.—The term eczema is very generally applied to any eruption which takes the form of vesicles or bladders. They may be as large as a sixpence when occurring on the thigh of a bullock, or as small as a pin-point and difficult to see without a magnifying glass, although from later signs one will have no difficulty in arriving at a diagnosis. An itching, a redness, and a crop of vesicles will occur in a period measured by hours in some cases, or a day or two may supervene between the first sign of irritation and the crop of vesicles. All the pocks commence as vesicles, but undergo pustulation at a definite period and are thus distinguished from the common forms of eczema. In many cases the first indication of eczema is a large superficial sore: the animal having rubbed and broken the vesicles before the trouble was suspected. Small animals, as young pigs, lambs, and puppies, seldom give one an opportunity of seeing broken vesicles unless a few remain outside the edge of the confluent sore created by rupturing into one another. The advent of some septic material or injury inflicted by the sufferer may in some cases result in pus formation in the papules, but as pointed out above, does not occur at a stated time, and the pustule of eczema has not the central depression and red areola of the pock, nor the accompanying constitutional disturbance; nor is it infectious. Scientific writers distinguish between eczema simplex, rubrum, and squamosum. The simple may pass to the red or to the squamous, in which a disposition to become chronic is noted, and then the animal throws off bran-like scales or scurf, and if a horse, can never be made to look well-groomed. Horses are prone to have eczematous eruptions upon the neck and quarters; other species more frequently suffer upon the nude surfaces under the arms and thighs, and along the belly or about the muzzle. Pet dogs are martyrs to eczema and in the chronic forms it often defies treatment, as the owners are with difficulty restrained from pampering their favorites with unsuitable food.

Treatment.—Since the disease comes from within, the treatment must be constitutional: outward applications being merely palliative or comforting to the suffering animal. Horses and cattle should have a bold purgative, followed by alterative doses of such things as bicarbonate of potash and soda, followed by small quantities of sulphur, nitre, and antimony. It is often quite sufficient to change the food. Sour bran, frosted roots, badly harvested forage of any kind, or the indigestion arising from want of exercise, may any of them give rise to eczema, which is a failure more often than not of the skin to perform some part of the work which the kidneys should do. (See Diseases of Urinary Organs, vicarious function, etc., at page 133.) Chronic cases derive benefit from arsenic in doses of three to six grains for the horse, and for the fatting ox seven to ten grains daily. Dogs take a twentieth to a fourth of a grain mixed with sulphur and sugar, and saccharated carbonate of iron. (See Table of Doses, at page 431.) For animals other than the dog and cat, lead lotions with glycerine, zinc ointments and any of the emollient class of remedies may be tried, in order to allay irritation and prevent that intolerable itching which leads to more damage of the skin than the disease itself. There is no specific for eczema, but the lines above are suitable for most cases. Before leaving the subject of eczema, it should be said that the disease occurs in wide patches and in small discrete ones in many and varying shapes, as in the outbreaks around the mouths of lambs and older sheep known as "wildfire," and again as aphtha, but all eczematous eruptions have a common likeness in the primary irritation: generally followed by redness, then by a vesicle; sometimes converted into a pustule, then scaling away (desquamation) and finally healing without the scar or pockmark which follows the variolous diseases or poxes.

Mallenders and Sallenders.—These curious old names are derived from Norman French and made their way to America *via* England and the Mayflower. They mean an eczematous eruption behind the knees and in front of the hocks of horses, and sometimes of fat beasts, and of ill-thriving cattle, too. It is at these situations the skin is folded upon itself when the limbs are flexed, and any primary irritation is thus added to.

It would seem to be constitutional and a genuine form of chronic eczema. The first symptom of heat and swelling is seldom observed and a crack with more or less watery fluid weeping from it attracts attention. It is seldom sufficiently painful to cause any obvious lameness, although discomfort before it breaks may result in a little stiffness in coming out of the stable.

Treatment.—Unless of quite recent origin and of a simple kind, this ichorous discharge should not be too quickly dried up with severely caustic remedies, or a breaking out will occur elsewhere—thrush, for instance, if in a front foot, or a puffy swelling around the hock, and falling into the fetlock if affecting a hind limb (sallenders). A ball of aloes for a hard conditioned horse or a gross one is desirable, and daily, small doses of salts in the food: half an ounce will be enough for a full-sized horse, as it is intended to act as an alterative and not a laxative to the bowels. The cracks should be washed clean, and then some healing and slightly astringent application used. Some will do best with oxide of zinc ointment with five per cent. pure carbolic acid; others with a one per cent. chloride of zinc lotion or a solution of lead in seven parts of seed oil. These are suited to early cases. The chronic, or those of some standing, but not hopeless from the curative point of view, are best anointed nightly with an ointment composed of eighteen grains of red precipitate powder, forty-five grains of burnt alum, and enough vaseline to make up an ounce weight. Cattle are benefited by the same treatment, but fat stock should be exercised when troubled in this way.

Grease or Eczema, Impetiginodes or Pustulosum.—This is classed as an eczematous disease, but we have seen many cases which have made it difficult to believe, as a fluid exudate seems to run out of many pores, and has the characteristic offensive odor which accompanies the ordinary kind which commences with congestion of the skin of the heels and pasterns, itching, which leads to stamping and rubbing of one foot over the other, or across the lower part of the limb, often inflicting injury with the shoe.

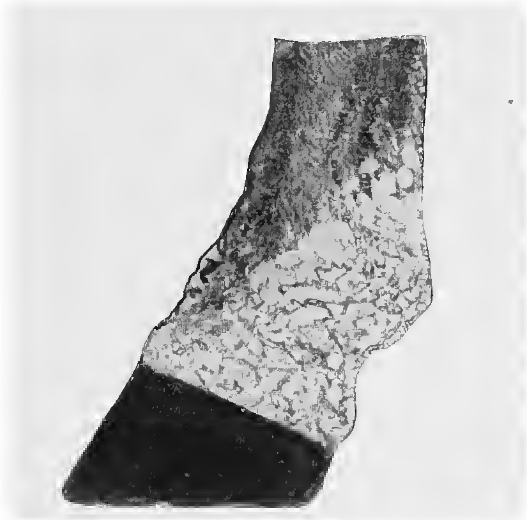

FIG. 28.—GREASE—ADVANCED CASE.

In the early stage, the chief symptom is an angry stamping upon the ground both by day and night: a distinction to be borne in mind, because horses stamp at night with another leg trouble, which will be referred to as Leg Mange (which see at page 276).

Grease is the bane of the heavy horse, and especially of the feathered Shires and such half-breeds as have round legs and gummy heels. The coarse, underbred nondescript is the worst of all to get it or get rid of it. Besides the constitutional predisposition, and indeed hereditary tendency, there are common exciting causes to be avoided, such as washing the legs when warm after work, watering in icy-cold streams or ponds, clipping the lower parts of the limbs and thus exposing them to sudden changes of temperature. Farm horses coming in with clods of earth sticking to their hairy legs should not be washed, but allowed to dry and the dangle berries broken up and combed and brushed out daily.

Symptoms, some of which have already been alluded to, include itching, rubbing, standing up of the hairs on end, swelling of the pasterns and heels, which swelling gradually extends upwards, increase of the discharge, cracks across the flexures at the back of the heel and fetlock, an increasingly foul odor, the formation of spongy fungoid growths having some distant resemblance to grapes —to the eye only.

Treatment.—This should be constitutional as well as local, and there is no preventive remedy so good or so cheap as Epsom salts (sulphate of magnesia). An ounce of nitre, two ounces of sulphur and a similar quantity of salts in a bran mash twice a week, will prevent a greasy subject from developing the disease in any but the slightest form. This remedy is elsewhere recommended for filled legs. The two diseases are quite different and should not be confused. (See page 29.) A ball of aloes two or three times a year should be given to chronic subjects, as well as the remedies mentioned above, or balls such as will be found in the chapter on Medicines (page 424). There are several good remedies for outward application, but many fail in the hands of the uninstructed as to their application. A greasy surface will not be quickly influenced by an aqueous lotion; therefore it should be held against the affected limb on a rag or sponge and the skin mopped with it. Washing is not desirable, but this will be better as a preparation, than pouring lotions over a mass of matter and allowing it to run off again. Ointments are not so beneficial in grease as caustic applications dissolved in water. A lotion for dark-colored legs may be made of half a pound of copper sulphate, four ounces of zinc sulphate and four ounces of iron sulphate in a two-gallon bucket of water. For white legs, a pound of sulphate of zinc: the other metallic salts leaving a stain that shouts "grease" to all who pass by. A very effectual lotion is chloride of zinc, and not expensive. Five per cent. in water for an ordinary case, and ten per cent. for a chronic, with a disposition to grapes.

When the fungoid growths have attained large proportions, it is best to attack them with a red-hot shovel and burn them away, as a preparation for the strong chloride of zinc lotion, by the use of which the worst cases can be kept under control, and the animal made workable and comparatively free from smell. It is the owner's own fault if he allows a case of grease to get beyond control.

Chapped and Cracked Heels.—An inflamed condition of the horse's heel in which there is a disposition to cracks in the skin, is known by the above terms, and as "sprayed," or as having "scratches," in provincial England. It occurs in summer as a result of dust and irritation, and in winter by grit and mud, melting snow, chilling rains, wading in cold water, and washing of the heels on coming into the stable. (See Grease, at page 261.)

To understand properly the nature of cracked heel one should know that the skin on the almost hairless hollow at the back of the pastern creases or doubles on itself when the limb is flexed, and this would cause friction but for the provision of little glands in the immediate region, whose office it is to secrete a soft, unctuous material to act as a lubricant. Anyone who will press his finger into the heel of a healthy horse will discover some of this natural lubricant upon it. Sudden changes of temperature, induced by the causes just mentioned, cause inflammation of these little glands and result in chaps or cracks which may be slight or serious according to the degree of inflammation set up, and the condition of the subject. The preliminary redness is often not observed, and the discovery only takes place when the horse comes out "hopping" lame in the morning. While the fluid resulting from inflammation is confined under the skin, the tumefied heel is capable of great suffering, but a breach in the skin soon occurs when the horse is exercised; the serum escapes, and the lameness passes off immediately the crack is fairly opened. If the subject is put back and treated, the best results will be obtained. This is not what usually happens, the horseman having other uses for his beast, and finding him going all right, pursues his journey, and more likely than not does nothing to the heel on returning to the stable. During the night the crack unites and more inflammatory products are accumulated, and the subject is again lame, and must go through the same process before relief is obtained. Each time this happens the edges of the crack thicken, and the prospects of a good, smooth, and lasting union are prejudiced. Many horses may be seen with thick seams or irregular scars thus caused, and with a loss of mobility in the heel and a disposition to renewed trouble and the development of grease, which disease often begins in this way.

Treatment.—A poultice of linseed meal and bran, which will be all the better for the addition of twenty drops of carbolic acid first mixed with a dram of glycerine or of linseed oil. Then wash clean and apply an ointment of zinc on a soft rag with a bandage lightly passed round it. The crack should then be clear of fluid, the edges soft but disposed to heal, and only needing rest in order to unite in a firm and lasting manner with the minimum of damage to the unctuous glands. It should be noted here that it is better for healing to take place somewhat slowly, because rapid union is effected by soft granulations which easily break away again when strain is put on the skin. (See Wounds and the Process of Granulation, at pages 294-298.)

If there is a distinct indisposition to heal, the process may be stimulated by a weak solution of sulphate of zinc—three or four per cent. of sulphate of copper for dark and hair-covered heels; but the practice of touching up languid ulcers should not be generally advised, because it pens up fluid and makes a coarse union as well as being more likely to break open again. It is sometimes advisable to use a weak chloride of zinc lotion to retard healing. (See repression of granulation or proud flesh in chapter on Wounds at page 297.) Chapped but not cracked heels are the more frequent results of summer dust in fine-skinned horses with more heel exposed than in others. For these, a washing out with a five to ten per cent. glycerine in water lotion is good. If this fails it may be well to use a dusting powder composed of ten per cent. boracic acid, five per cent. calamine powder, and eighty-five per cent. of starch powder.

Mud Fever, Erythema.—The true cause of this disease is doubtful. What it is in the mud or soil which in one season causes inflammation of the skin where it adheres, and in another has no injurious effect, is not known, but the fact is beyond all question that the parts where mud is splashed become acutely inflamed and cause serious constitutional as well as local disturbance. In the hunting shires of England it occasionally appears in a severe form and in one year something like half the horses in London were incapacitated.

It was observed that the uncared-for night cab horses, put away wet and dirty and with unclipped legs, escaped the malady, while the valuable animals of the wealthy suffered much, and from that time forward the Irish custom of clipping the body and leaving the limbs was generally adopted for hunters, and to a great extent among the working studs in great cities. In the year 1871 the disease was so severe that many horses died of fever induced by the inflamed skin. There is no difficulty in diagnosing the malady, as it only occurs where the mud has adhered.

Treatment.—Wash the parts with a ten per cent. glycerine bath, mopping with a soft towel but not drying, in order that a film of glycerine may remain as a protective layer. One per cent. of carbolic acid added to this lotion will be advisable in dirty stables where septic germs are present and erysipelas is feared. A few hours later a lead lotion composed of one part liquor plumbi fort., and eight parts linseed oil may be applied with advantage, or a mixture of two ounces of glycerine, two ounces of fuller's earth, and a quart of soft water. Several applications daily are advised and the skin should in no case be covered by bandages. An ounce of nitre, a quarter pound of salts, and a quart of water, should be given as a draught at the commencement of the attack, and daily for a week, a dram of nitre and an ounce of bicarbonate of potash in the drinking water. A laxative diet is best. (See Sick Foods, at page 418.)

Nettle Rash, Urticaria, Surfeit.—All species are liable to a sudden eruption of elastic eminences of a round or oblong shape upon the skin, but it is chiefly important in connection with the horse because it may change the color of the hair and leave a dark skin spotted with gray or other light hairs. Cattle, pigs, and dogs are much prone to it, and from dietetic causes.

Its appearance is often quite sudden. A horse may be on a journey and apparently in the pink of condition when he is all at once observed to have a lot of lumps come up on his neck and flank: perhaps after a good drink of cold water. It often disappears before he returns home, but more likely slowly dissolves in the course of two or three days. In a few cases it persists for a week or ten days and it is in these that discoloration takes place. There is, too, some confusion between this very evanescent disease and surfeit, which is an irritability of the sudorific or sweat glands caused by attempted vicarious function on the part of the skin. From this no doubt most of the cases occur in fat stock, and in pigs and dogs.

Treatment.—In a simple case of nettle rash there is not often much itching, but in surfeit there is a good deal of irritation and animals are disposed to rub themselves. For the latter, a cooling lotion of one part vinegar in six or eight of water is useful: or two ounces of sugar of lead in half a gallon of rain water.

It is desirable in all cases to give an aperient. Aloes to horses and ruminants, if circumstances will permit of idleness; or if the horse must work and the fat beast go to a show on a certain date, a course of salines will answer the purpose; salts, sulphate of soda, and nitre being good for cattle, and sulphur, nitre, and carbonate of soda for swine. (See Table of Doses, at page 431.)

Burns, Scalds and Frost Bites.—The same results are produced by all of the causes above named. Nothing more than redness may be seen, or blisters, or the injury may have been so severe as to produce death of the part. Most of us have learned the meaning of the two first upon our own persons, and as burned children, dread the fire. The simpler burns, scalds and frostbites exhibit only a superficial inflammation with a loss of hair and desquamation of the cuticle. Under the blister will be serum, and this may turn to pus, as in the various pocks, and with similar results if broken, namely, a ragged ulcer, and a final scar or blemish which need not follow a blister if protected from injury.

Burns and scalds happen to horses engaged in factories and works, in the same manner as they do with men. Dogs and cats put themselves in danger by reposing in front of a fire where burning coals may fall on them, or the family kettle boil over. The parts most frequently frostbitten are the coronary bands and heels of horses and cattle. Animals die from the nervous shock sustained by burning or scalding, as when a stable is alight and the horses got out with difficulty, and a large surface is injured. The effects are greater on a superficial burning of a large area than from deep and more severe injuries of the same nature. The deep scoring of the firing iron on two legs performed at one time, does not produce the same shock that some scorching or scalding about the head and neck may be expected to do.

Treatment.—Shock, as we have said, may cause death and secondary consequences of burns may lead to erysipelas and sloughing, or local death of tissues, which necessitate the destruction of the subject. It is of the first importance to immediately protect the injury from atmospheric influences, as most of the evil that follows is due to the entrance of deleterious organisms. If nothing better is to hand, olive or any seed oil should be freely applied: a piece of muslin or worn underclothing soaked in the oil and made to cover the affected parts, and held by lightly applied bandages that will not slip down. Of all first-aid dressings for burns and scalds, nothing is so good as carron oil. This is made by shaking together equal parts of lime water and linseed oil. The writer has received many benedictions from farmers and their families for having either presented them with or advised their getting a bottle of this invaluable liniment, and another of carbolized oil (one part pure carbolic acid to twenty parts olive oil), as with these two bottles, an accident to any member of the household or animal on the farm may be treated at once while waiting for the doctor or the veterinary surgeon. A fresh burn or scald will generally benefit by dredging flour over the carron oil, and again carron oil at the next dressing. After a day or two the carbolized oil will make a good change and is valuable as a corrective or antiseptic. The finer-skinned animals are often benefited by alkaline washes, as a five per cent. solution of bicarbonate of potash or soda, and those which pass from acute pain to much itching will find relief from a ten per cent. lotion of glycerine in water. Two per cent. of carbolic acid may be added to this lotion if the parts have a bad odor. Constitutional treatment is directed to holding up the patient with first alcoholic stimulants, and later by quinine and gentian, nux vomica and other tonics. (See Table of Doses.)

Bites and Stings.—Bites inflicted by animals upon one another are in the nature of punctured and lacerated wounds. (See Wounds, at page 295.) The bites of venomous reptiles are small, in the sense of wounding, but of the utmost importance on account of the introduction of poison into the circulation, and having immediate effect. Snake poisons as a rule are of the narcotic type: producing paralysis of the vital organs. It is no mere jungle tradition that men have been saved by intoxicating and even lethal doses of alcohol—lethal at other times, that is to say. In the case of animals we do not risk our own lives to suck a wound as one might for an only child, but we hack out the bitten portion as best we may, if not trained surgeons. As a matter of fact the rough tearing away of tissues is less likely to set up fatal hemorrhage than clean carving, and some amount of blood from a snake bite is rather welcome than otherwise. Since these accidents always occur when folks are not prepared, the veriest novice should not fear to act both promptly and boldly with his pocket-knife. Alcohol may be poured into the animal in any form it can be obtained, and repeated as long as there is any hope of combating the fatal paralysis of the heart which threatens. So far, this treatment is in the nature of a physiological antidote (see Antidotes, at page 477), for we know of no certain chemical ones. The hot iron or actual cautery has been applied with success, and more or less benefit is derived from coagulating the albumen in living flesh by nitrate of silver or lunar caustic, copper sulphate, or chloride of zinc: these things being thrust into the punctured wound energetically. If the patient can be held up by stimulants and some at least of the virus destroyed in the seat of injury he may weather the storm; the poison will have spent itself, and the drunken headache will be but a little matter compared to the consequences of letting the virus have its full effect.

The bites and stings with which we have most often to do are those of insects (as for convenience we lump together winged creatures and arachnidans). The material introduced into the victim is for the most part formic acid, or varieties of it, and the pain and annoyance out of all proportion to the wound inflicted. Horses and other large animals have been killed by swarms of infuriated bees when hives have been upset, and in some instances where no ground of offense existed. A swarm disappointed of a new home will sometimes be seized by the spirit which animates a mob: particularly such mobs as the Latin races produce, and Carlyle described as " the red fool fury of the Seine," and in such mood a luckless horse in harness and quite unable to protect himself or flee from his enemies and seek water, may be stung to death.

We may stop to draw a moral here and say " fence off your bees, especially if you have colts running free," for they are often disposed to " nose " over hives out of curiosity or *ennui*. Hornets, mosquitoes, blood-flies and other winged pests, as sand-flies around Chicago have a game of their own to play, and the morals of the Wheat-pit.

Treatment.—There is a fortune for the man who can invent a safe, simple, and inexpensive fly protector that will neither spoil the glossy coat of a show animal nor need too frequent application. It is necessary to remove by forceps or tweezers all the stings that are left in the skin. They can generally be seen, although not so readily on a hairy animal as on the fair skin of a white child. The itching and smarting set up by its presence causes the sufferer to rub, and the rubbing diffuses the poison, as everyone must be aware who is acquainted with the merits of " Jersey Eagles." Alkaline washes help to neutralize the stings of insects. A weak ammonia solution is the best because more penetrating among the hairs than carbonate of soda or potash, which may be used in the absence of ammonia. The household remedy of the blue bag is more or less useful because the coloring matter is mixed with an alkali, not on account of any merit in indigo, or the artificial substitute made by a synthetical process discovered in Germany. One would not apply ammonia round an animal's eye, of course, or it might do more mischief than the sting, but would employ some remedy that would allay pain and prevent the patient from doing himself damage by rubbing. A suitable lotion will be found in the following:

Cocaine	5 grains.
Whiskey	15 drops.
Glycerine	15 drops.
Water	1 oz.

Dissolve the cocaine in the spirit and water, and add the glycerine. This should be applied with a small brush every twenty minutes until the pain is relieved. The carbolic oil previously recommended for many purposes as a remedy to be kept in the house, will help to soothe the pain arising from stings: especially in the second stage. Camphorated oil is another useful liniment for application to stings and is advised for cow's udders when, as not infrequently happens, the animal inadvertently lies down upon a wasp. Preventives, as we have hinted at the beginning of this chapter, are not of great service, but there are times, as on a thundery day when agricultural operations must be pursued and flies seem desirous of eating us and our horses alive, that we find it the lesser evil to make frequent applications of water in which kerosene has been agitated, or employ a little eucalyptus or camphorated oil around the eyes or other parts where special annoyance is caused. Four ounces of quassia chips, an ounce of tobacco, a wine-glass of kerosene in a gallon of water, shaken up and applied at intervals, affords some degree of protection and is a very cheap preparation.

Ticks.—Ticks are an annoying pest and difficult to destroy except by arsenical dips such as are used for sheep (see Scab, at page 273), and in districts much subject to them, the parasites should be looked for daily about the arms, on the comparatively hairless portion under the elbow and thighs and udder of cows, which must come under the milker's observation twice daily. From such positions and about the face and ears of dogs they can be removed by hand. Their chief importance consists in the infection they carry from the diseased to the healthy animal. They have been conclusively proved to be the cause of Texas fever and of the terribly fatal form of red water in South Africa. (See Red Water, at page 20.)

Warts, Angleberries, Wens, Verrucae.—There are three principal kinds of warts. They are all unsightly and some of them cause both inconvenience and pain and detract from the value of the animal. They occur in all sorts of places, and the treatment suitable in one part may be inapplicable in another. What may be safely undertaken on the belly will be attended with risk on the eyelid. The narrow-necked or pedunculated, the broad-based, and the encysted, will need different handling. They may be of any size, from that of the pin's head to the mass weighing several pounds, and depending from the flank of a bullock.

All those with necks are best strangled. For this purpose we use material varying from the thickness of fine silk or thread to strong twine. It is the arrest of circulation that kills the wart, since it is dependent on the blood for its nourishment, like every other living tissue. The ligature should be applied as tightly as possible and secured by a knot that will not relax. A doctor's or a reefing knot is most suitable. The broad-based must be destroyed by caustic or corrosive agents. Care is necessary in their application to avoid injuring the adjacent sound skin and still more to safeguard the delicate organs of sight and hearing and those of reproduction. The most powerful remedies are nitric acid and sulphuric, but better results are obtained by the judicious employment of arsenic in the form of paste, made by mixing one part of arsenious acid with two parts of soft soap. This substance must not be dropped upon the ground as its saline taste is attractive to pigs and fowls.

Several applications may be necessary if the wart is large. For such as are situated about the eyes of horses and upon the teats of cows it is better to use salicylate collodion, made by dissolving one part of salicylic acid in seven parts of collodion. It is painted on rapidly and allowed to dry. About the third day the dead scab should be picked off to enable the solvent to act the more quickly. Liquor potassæ also dissolves warts, but is not so active as the above named. The encysted or such as are contained within a sac under the skin are easily disposed of by anyone not afraid of the knife. The little tumor should be squeezed up between the finger and thumb, as a castrator would operate, and the tense skin incised boldly; then the wart or encysted tumor can be squeezed out, and the wound will heal without difficulty. In some cases, particularly with dogs, we find many smaller tumors within the same sac, waiting an opportunity for development. These must be scraped off from their attachments or some will grow.

Dogs and other animals are occasionally found with a great number of warts inside the cheek; looking like small cauliflowers. In this situation they are difficult to dispose of by any means, but they generally disappear as mysteriously as they come.

Horn Troubles.—Horn is composed of the same material as the surface of the skin, horns, hoofs, nails, and skin being similar except in their density or the manner in which the layers of epithelium are arranged. Warts, which have been considered above, are piled-up epithelium, and often acquire a horn-like character. Crooked and ill-formed horns may be trained by such appliances as that in the illustration. The turning in of the horn is followed in time by injury to the parts with which it comes in contact, and we have seen

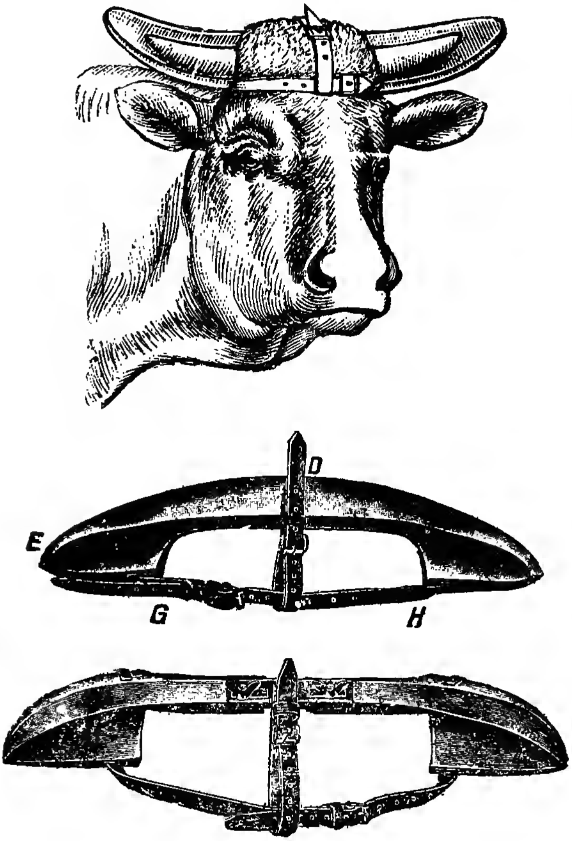

Fig. 29.—Horn Trainers.

eyes, ears and skulls pressed upon in this way. When past the stage for training, they should be sawn off with a tenon or cross-cut saw, and it should be remembered that if the core has to be cut at all it will hurt the beast no more to take back a good length than it will to cut off a short one, and have the job to do again in nine months or a year. Horns thus wounded, or the core exposed by accidents, as when bulls fight and break off a member, should be promptly bound up with tow and tar, or clean rags and carbolic acid and oil, to prevent bleeding in the first instance, and the intrusion of septic germs and abscess formation in the second. A still worse thing may happen in the hot season when flies fill the sinus with maggots, and these burrow. This is a not infrequent cause of death in fly countries like Egypt and the greater part of South Africa. Dishorning, so much practised in America for animals intended for shipment alive to Europe, is a rough and somewhat barbarous operation, which may be obviated if the new-born calf has the bulbs rubbed two or three times with caustic potash. Surely it is better to prevent them coming than to laboriously saw them off when mature. Many of the polled breeds find favor now and take less room aboard ship, but we are told by the consignees in Europe that more broken ribs are incurred among polled beasts than among the horned, which mutually respect one another. New horns are always shabby-looking substitutes for those broken off. If bullocks have to be cast for shoeing or for surgical operations they should be put down on a deep, soft bed, and care taken to avoid injury to the horns.

Mange or Scab.—Mange has been known from the earliest times, but there are people living yet who confuse it with eczema and do not know that scab in sheep is due to the working of mange mites. There is no species so far as is known that is exempt from mange. Each species has its own parasite. The mange of the horse is not caused by the same creature as the scab in sheep, nor is the mangy dog infectious to the cow, or any but the canine species. The mange mites are divided into three classes, differing in their habits: the Symbiotes, which remain upon the surface of the skin and live upon its secretions—promoted by the irritation set up by their presence and the itching and rubbing it induces; the Dermatodectes, which bore through the skin in their quest of food; and the Sarcoptes, which not only penetrate the skin but form runs or galleries under it, at the end of which they deposit their eggs, and are for this reason the most difficult to dislodge as well as having the most destructive influences.

Symptoms of mange are those common to any skin irritation at first and consist in itching and annoyance to the animal: leading him to rub, bite, scratch, according to his species. The appearance of sore or moist spots, with the hair falling out, and extension of the mischief, marks the further progress of the malady. The head and neck are commonly attacked first, because these are the parts most likely to come in contact with other infested animals, and in the case of harness animals to have the disease communicated by the bridle, the collar, and the saddle, or harness pad. The back or croup is not rarely the first portion invaded in animals employed exclusively in draught. There are seasons in which mange mites

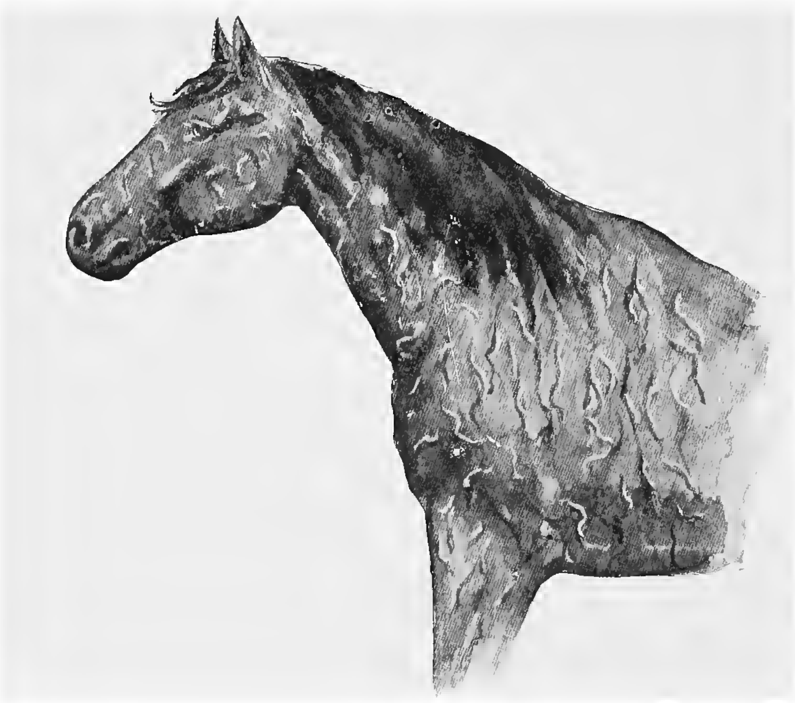

Fig. 30.—Mange—Wrinkled Skin.

enjoy great prosperity and multiply in millions in the space of days, and others in which they retain but a precarious hold upon their victims. This is particularly well shown in the case of foxes. No country-side is free from mangy foxes altogether, and there are hunting seasons in the British Islands when sport is utterly spoiled by the emaciated victims of mange being unable to hold a straight neck and give hounds anything of a run. The following year there will often be strong foxes and very little mange. This natural variation, as in the number of sheep and goats affected in the South African States, was interpreted by the backward doppers as a kind of sin gauge whereby the people were afflicted for their neglect of the virtues preached by the predicants in the chapels. The present writer was once consulted by the then Cape Government as to a scheme of free dipping, but the difficulties were insuperable on account of the ignorance above referred to, and to the native owners of small lots who would have frustrated all efforts on the part of the authorities.

It is not always possible for the veterinary doctor to say offhand whether a skin rub is due to mange or is a broken patch of eczema in which the characteristic vesicles have been crushed out of recognition, and yet it is most important to find out at the earliest moment whether a skin trouble is due to parasites, and therefore infectious. He will look for other spots and on the edges for any signs of vesicles (see Eczema, at page 258), and if other animals are living in association will ascertain if any have begun to rub. A scraping of the mattery skin will provide the material wherewith a positive diagnosis can be made with the aid of a magnifying glass. Broken bodies or whole ones will be discovered if mange is the trouble. It may be remarked here that the outer margin of a sore or rub both in horses and sheep should be chosen for a scraping, as the center of the sore has been grazed and the flock of mites will be on the outskirts in greatest numbers. Symbiotic mange will often exist for a considerable time without making any very serious inroads upon the skin, confining its field of operation to limited areas, as the neck, the withers, and croup. Mange is not even suspected, because the animal merely rubs a bit, as do many without any serious disorder. If neglected, however, there comes a time when a sudden and great increase takes place in the number of parasites, or the disease is spread to other subjects, and then for the first time the true nature of the malady is discovered. Itchy areas should always receive early attention, and the prevention of disease be uppermost in the owner's mind, who will carry on the war against parasites. Sarcoptic mange excites furious itching: its spread is generally rapid and the subject of it continually rubs, and does so much damage to the skin that it is swollen in ridges, with channels between, gives out a discharge, and an offensive odor. Owing to the annoyance the animal gets insufficient sleep and loses flesh and condition generally.

Leg Mange.—In speaking of Grease, at page 261, the symptom of stamping and rubbing one leg over the other was mentioned, and the owner advised to observe if this occurred chiefly at night. This sign of irritation about the extremities is too often credited to incipient Grease when indeed it is caused by a symbiotic mange peculiar to the lower parts of the limbs, the parasites confining their attentions to the parts below the knee and hock and in the generality of cases not reaching either of those joints. These symbiots remain quiescent during the day but feed at night, and their movements excite great annoyance and prevent sleep. Horses with feathered legs soon break the hair and often cause blood spots by rubbing with the shoe, or clenches that have got up.

Treatment.—Symbiotic mange occurring in small areas, as where an infested collar or pad has been the means of introducing the parasites, may be quickly cured by the application of mercurial ointment, or sulphur ointment to which some spirit of tar has been added, or either of the mange ointments or lotions given at page 472, but the horse furniture must be disinfected or fresh attacks will occur. All brushes and tools and mangers should be similarly treated and none of them used upon other animals.

Leg mange occurring in thick and coarse hair needs different management, and if the owner is in doubt as to the cause of stamping and rubbing, he will be safe in adopting the following treatment: Rub in soft soap, including a space a little beyond the apparently affected area, and plaster it on half an inch thick; leave it thus for half an hour for the purpose of lifting the superficial layers of the skin and softening the roots of the hair. Then take plenty of warm water and wash out thoroughly. Finally apply a five per cent. carbolic or chloride of zinc lotion, soaking it well into the affected parts. This is best done by immersion in a bucket containing the medicament, but the more sensitive heel should be quickly wiped out, and some simple ointment or lard applied to prevent cracking. It may be necessary to repeat the operation in a week, but the soft soap-treatment so opens the playground of these mites that few are likely to escape, while any other plan is but partly successful because of the accumulations of cuticle, under which a few pregnant females hide while the storm lasts.

Sarcoptic mange, by reason of the burrowing previously mentioned, is often troublesome to deal with, and repeated applications are necessary. Unless the weather is very cold it is well to wash with soft soap and warm water before applying the chosen agent. This may consist of tobacco and sulphur, or oil and creosote (see page 472), but cost is a consideration where a large surface has to be dressed, and we have to be careful not to employ anything likely to be absorbed or otherwise prove injurious to the patient. We may not use the mercurial smears advised for small patches of symbiotic mange. It would not be safe in the case of swine or dogs and the limit is soon reached in respect of horses and cattle. Where gallons of dressing will have to be used, a cheap and effectual one may be made by boiling together five ounces of flowers of sulphur, and one ounce of slaked lime, with a gallon of water, for half an hour, or until the decomposition desired takes place. The mixture should assume an orange-yellow color, and give off the smell of rotten eggs before it is ready for decanting. This destroys the mange mite effectually, and costs no more than five cents per gallon, but it is greatly improved by the addition of four ounces of glycerine to act as emollient and healer and allay irritation and make the lotion more lasting in its effects. This preparation should not be made indoors, nor should the housewife be asked to loan her fish-kettle for the purpose. It must be made fresh each time of using, as it quickly decomposes and is then no good. Brushes, mane combs, etc., can be treated by a first dip, and a last when they have been used to ensure the proper application of the lotion.

Sheep Scab, Scab or Mange.—It is important to recognize this trouble before it spreads, and the newly invaded parts where a tuft of wool looks loose and bush-draggled is the most likely place to take a scraping off the skin and examine through a fair-sized magnifying glass. The injured parts already denuded of wool and having the characteristic scab from which the disease took its name, are not so likely to provide living mites as the fresh pasture to which the parasites have recently migrated. Sheep-dips are now made better and more cheaply by firms devoting themselves specially to their production than anyone can make for himself, unless he is in the position of some American farmers who have much tobacco refuse or damaged leaf that cannot be marketed. For these, the formula recommended by Law is worth using. It is made as follows:

Tobacco	16 lbs.
Oil of Tar	3 pints.
Soda Ash	20 lbs.
Soft Soap	4 lbs.
Water	50 gallons.

Macerate the tobacco in three successive portions of water and add the other agents to the fluid.

The writer has dipped with all the recognized preparations and labored in the compounding of old-fashioned soft soap, arsenic, brown umber, and sulphur pastes, but has come to the conclusion that the carbolic and other coal tar preparations are all inferior to the powders composed of arsenic, caustic soda or potash, and sulphur. The alkalies help the solution of the arsenic and the combination gives the fleece a resisting power to the mites and to the maggot fly for a considerable time after the immediate destruction of parasites alive upon the animal at the time of dressing. Enough of it remains to destroy a new hatch.

Mange in Dogs and Cats.—Dogs can generally be cured by an old-fashioned mixture of equal parts of spirit of turpentine, oil of tar, and olive oil. This lotion applied liberally over ten cats will certainly kill nine of them. For the latter, a dram of freshly prepared sulphurated potash, half an ounce of glycerine, and half a pint of water will be found suitable.

Ringworm, White Flaw.—There are two kinds of ringworm besides a variety of eczema often mistaken for it. (See Eczema, at page 258.) The common form is due to a vegetable fungus called Tinea tonsurans, of the genus Trichophyton, and affects man and the domesticated animals. The most frequent trouble it gives the farmer is about the head, neck, and other parts of young stock at the end of the winter, when it appears as white, irregular rounded patches, of what is really piled-up epithelium, mixed with the parasitic fungus. It gives least trouble on open ranches, and most in enclosed corrals with timber fences; the fungus apparently finding a home in the wood.

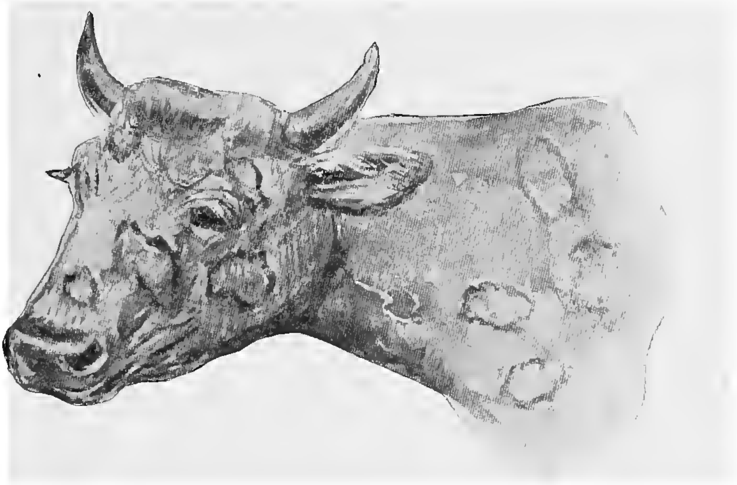

FIG. 31.—RINGWORM ON CATTLE.

Treatment.—Don't try a short cut by rasping it off, as you are more likely to infect yourself than to cure the bullock. Soak the patches with an ointment or paste of soft soap, three parts, and sulphur, two parts, and oil of tar, one part, as the soap swells up the epithelium and opens it for the tar spirit and sulphur to get into contact with the fungus. Destroy this, and the scab falls off: the skin recovers, and hair is renewed.

Horses are not so subject to it while out of doors, but in city studs, where they are bedded on peat moss, the parasitic fungus flourishes in the moist material under the horses, and many become infected. Rings are generally noticed on dogs and cats before they spread, and these, like horses, may be cured by the application of tincture of iodine. We have cured many cases of long standing in children by the application of old-fashioned black ink, made of logwood and sulphate of iron, when more complex remedies have been found useless. A dressing much in use in England is one part of creosote to eight of olive oil, and this may be used for any species save cats.

Honeycomb Ringworm, or Favus.—This is quite different from the common type of ringworm and is never very widespread or general. It occurs as a depression of cup shape and waxy in appearance and is difficult to eradicate when in a situation where the knife cannot be freely used. And it is in such situations that we find it: as around the mouth and eye. Whether it originates with rodents is not for certain known, but cats get it upon their feet and lips through seizing affected mice, and terriers become similarly infected by catching rats: and children by cuddling dogs and cats. In the few cases met with in horses and cattle, the muzzle or head is the seat of it, and naturally so because this is the business end, and most likely to come in contact with another animal already infected, or with mangers or other substances capable of conveying the disease.

Treatment.—Cut out with a clean sharp knife if in a fleshy or safe part. The frequent application—say twice daily—of tincture of iodine, or a strong solution of either the sulphate of copper or iron will destroy the fungus, but it must be thoroughly done, and in the writer's experience it is necessary to soak open the cup-shaped sore with soft soap and warm water or soda before the remedies will penetrate a surface which throws off aqueous preparations like a duck throws off water.

Fly Maggots, Sheep Fly, etc.—Under the shade of trees and on hot mornings the fly lurks privily for his victims. *Her* victims, it is more correct to say, for it is the female desirous of depositing her eggs that causes all the mischief: the male having no other but family duties to perform and to make the best of a short but merry life.

Any sort of sore or discharge of matter is particularly attractive to the flies coming under the carnaria division, and sheep with diarrhea are liable to get sore about the perineum, and such as have not been docked short may have the tail stuck down to a festering mass which invites the fly to oviposit and a writhing mass of maggots follows. A slight cut in clipping or shearing, or any rub or abrasion is chosen, and even without these there are periods when the fly will puncture the skin.

Sheep will seek the shade to get away from the sheep bot-fly (Œstrus ovis), for all bot-flies dislike shade, and so find themselves between the hammer and the anvil, and it behooves the shepherd to be always prepared against these enemies. The itching or first sign of irritation is easily noted by the sheep shaking his tail in the open, and rubbing against any sort of fixture. The application of carbolic oil, of one in ten strength, will kill the maggots and act as a healer to the damaged skin, and for a time prevent fresh attacks. Many European shepherds carry a bit of "sublimate" or perchloride of mercury which they call in England "fly stone," and rub lightly into a fly-stricken spot. It instantly turns up the maggots, but damages the pelt, and the carbolic oil is much preferable. Another good preparation is spirit of turpentine, one part, to three parts of any bland oil, as poppy seed or rape or linseed: olive oil being rather expensive.

Prevention by the sprinkling over with so-called fly powders is desirable in districts where the fly is known to be an evil. The coal tar series diluted in twenty parts of water, answer for a time: such preparations as phenyl or cresol or Jeye's fluid in four per cent. dilutions with water, are obnoxious to the fly, but not so lasting as the old-fashioned powders. A useful formula in use for the last hundred years among pedigree flocks in Britain is the following:

Red Lead	15 ounces.
White Lead	30 ounces.
Sulphur	23 ounces.
Spirit of Tar	3 fluid ounces.

The white and the red lead are made smooth by rubbing down in a mortar with the tar spirit: the knobs in the sulphur broken down by rubbing through a sieve and then the whole mixed and sifted.

It is necessary to spread the compound out for a little drying before putting away in a canister. The mode of application is to take the sheep in the early morning with dew upon his fleece (or lightly sprinkle with a garden can having a fine rose on the spout) and part the fleece down the back, and shake on the preventer by means of a flour dredger such as housewives use. This affords protection for some little time and is inexpensive. A flock of some hundreds can be got through in two or three hours if conveniently penned for handling.

Fleas, Lice, Ticks.—The fleas discovered in our homes are not imported by the pet dog, as many ladies imagine, when they haven't used the trolley car and can't blame that. The dog flea is not the same as the human parasite, and if perchance one wanders upon the baby's soft skin he is out of his environment and only waiting an opportunity to obtain a canine host. The dog, cat, and chicken are the chief sufferers. For the dog we may prescribe a bath with a wine-glass of Jeye's fluid, or Pearson's, or other similar convenient emulsion without too much resin in it, to a gallon of warm water. It does not need to be strong, so much as to be properly applied. It may seem unnecessary to tell readers how to wash a dog when he hasn't to be made ready for a show, but only to kill the fleas on him, but when one has seen the job muddled for about forty years there is a natural desire to say how. Stand him in the bath first: then begin with a sponge to wet his nose, chin, face, round his eyes, inside his ears, unless plugged with wool dipped in camphorated oil, and so backwards until the whole dog is thoroughly soaked with the medicated bath. The reason for this manner of procedure is that the novice always wets his back first, and allows ample time for the enceinte females to seek asylum inside his ears, and wait, like Noah in the ark, for better weather, before coming out to replenish the earth—" each after his kind." There should be abundant rinsing with plain water and the last douche should be cold. None of these coal tar preparations are absolutely free from risk, and the pink-skinned varieties of dogs should not be immersed any longer than can be helped. Cats, as stated elsewhere, must not be dipped in cresols or carbolic preparations. Those with long and matted coats are troublesome to cure of fleas. They may be made undesirable hosts by frequently rubbing into them a mixture of equal parts of powdered pyrethrum and flowers of sulphur, followed by combing and brushing until the parasites are either killed or have deserted. Pyrethrum is not an absolutely reliable flea-killer, but it so intoxicates these insects that they fall out upon a sheet of paper placed under the cat during the operation, and can be consigned to the flames. A similar mixture, or one consisting of half sulphur and the rest freshly slaked lime, is a good thing to dust into fowls that are infested. They should be taken off the perch at night and the powder shaken into them while held up by the heels: then replaced upon the roost. The nest boxes need similar treatment to prevent reinfestation.

Lice are destroyed by the same means as fleas, but simpler and safer methods are as effectual. A sufficient quantity of any fixed oil (linseed is generally the cheapest) will block their breathing pores, which are situated along the abdomen. Oil is the remedy for cold weather, when housed stock towards the end of winter are apt to be much troubled with lice. In fair weather, a cheaper wash may be made of tobacco and paraffin, soap and water. A quarter pound of the first, infused in two gallons of boiling water for an hour, with half a pound of soft soap, syphoned off, and shaken with half a pint of kerosene, makes a good killer of lice, and should be well brushed into the skin: giving particular attention to the forelock, the mane, and tail, as these afford shelter and require much more soaking than other parts. Horses and cattle thus treated should be exercised until dry, or a chill is liable to follow.

Lice on pigs generally accumulate around the ears and neck and may often be disposed of by a few judicious rubs of mercurial ointment. They are not handy things to wash, but sulphur or stavesacre salves can be applied without that forcible restraint which always makes pig doctoring a big business.

Canker of the Ears.—This trouble among dogs and cats is almost always due to the presence in the meatus of minute parasites of the mange class (Symbiotes auris canis et catis). The fact that spaniels and long lop-eared dogs are more troubled than others is due to the greater shelter afforded and the increased warmth, not to their habits of going into water, as was formerly supposed. The fancy breeds of cats reared in artificial conditions have spread the disease to a great extent among common-bred ones.

Symptoms.—These are common to any irritation of the ear, and consist of shaking the head, scratching and digging at the base of the ear with the hind foot. If not treated at this period the patient aggravates the case by his violence and an inflamed condition of the little glands inside the organ follows: the discharge itself reacting prejudicially upon the tender lining. Ulcers are established, the cartilage is involved, and the case becomes hopeless. Dogs have been tortured in the past by caustic remedies applied with a view to heal ulcers, just as might be done outside. They should never be allowed to form.

Treatment.—The parasites should first be destroyed by a dressing of nitrate of mercury ointment, diluted with thirty parts of lard. Two dressings on successive nights will effect this. The ear should then be cleaned out with cotton wool, and daily afterwards the meatus filled with a lotion consisting of forty grains of oxide of zinc, five grains of sulphate of zinc, fifteen grains of boracic acid, half an ounce of glycerine, and two ounces of rose-water. Some will derive more benefit from the application of plain zinc ointment, after the parasites have once been killed. Besides true canker there is an otitis or inflammation of the ear arising out of dust and heat and other causes not well defined. In such cases the ear should be well washed by warm soapy water syringed into it, wiped carefully dry and then the zinc ointment applied.

External Canker.—The term canker is also applied to ears—generally drop ears—of which the margin becomes injured by self-inflicted blows from the hind foot, by other forms of violence and by frostbite. An ulcer is established and refuses to heal. This is partly due to the large amount of cartilage and small quantity of blood circulating in the ear flap, but still more to the constant shaking of the head from which the animal can only be restrained by a cap.

Treatment.—An attempt should be made to heal the ulcer by painting over it with flexible collodion twice a day, or a mixture of friar's balsam and glycerine, while lubricating the rest of the ear with zinc ointment to keep down itching as far as possible.

Some clean, soft, cotton fabric should be made into a cap that will enclose the ears. If these means fail, it may be well to carefully cut away the diseased portion, when there will be a better prospect of healing in what is a surgical wound.

Abscesses, Boils, Lumps, Bumps.—Swellings upon animals are a frequent source of trouble, often occurring under the harness or saddle and quite incapacitating them from work. Harness and saddlery most frequently cause them in horses, but all animals are liable to the formation of abscess from external violence incurred in a variety of ways: brutal attendants included. They are of two kinds. The one contains pus, like the familiar boil from which few of us escape altogether, and the other is a filling of serous fluid—the colorless portion of the blood—although this may be straw colored or tinged with red through the rupture of small vessels. They need quite different treatment. The phlegmonous or pus abscess (boil) must be encouraged to suppurate and not opened until fully ripe. The serous abscess may be lanced early, its contents pressed out, and a little antiseptic injected into the cavity. Its tendency is to close too soon and reform. The pus abscess forms rapidly when the injury is confined to muscular tissue, as when a drover hits a beast over the back, and it is slaughtered three days later, and shows a foul cavity and is known to butchers as "licked" beef. The symptoms of this kind of abscess are swelling and tenderness, and on parts not covered by hair, redness will be noticeable. As the mattering proceeds, the tumor has a disposition to become prominent at one part, where it will be found to fluctuate under pressure of the finger, and impart a feeling of thinness of the skin. This is known as pointing (see Strangles, at page 47), and here the lancet should be used. If left to nature, the boil will break of itself, but the animal suffers longer than he need if a judicious stab is made at the thin "point." Frequent fomentation and the application of poultices where the position lends itself to such measures will favor the ripening process. With unbroken animals we have to do the best we can and promote the process of suppuration by applying a mild blister or strong liniment. Superficial abscesses or those occurring in soft tissues usually run their course in a short time and end favorably. Our trouble comes in with what are called deep-seated or cold abscesses. In their case, weeks, months, perhaps a year or more, will be occupied in forming matter and reaching the surface. Of this kind are the abscesses which precede fistula. Poll evil and fistulous withers and quittor all begin by mattering or suppuration and end in a pipe or drain. (See Poll Evil, at page 299, and Fistulous Withers, at page 289.) A deep-seated abscess need not necessarily result in a fistula. When it does, it is because some dying or dead tissue remains and is not cast off in the matter of the abscess. When the fibrous nature of the withers is remembered, or the cartilage at the side of the foot brought to mind, it will easily be understood how some injured fragment may hang on and refuse to be detached. As an example of cold abscess or deep-seated suppuration seldom leaving a fistula behind, we may take those hard lumps upon the point of the draught-horse's shoulder. Bruised by the collar underneath the hardened skin accustomed to bear pressure, a slow inflammatory process goes on; the animal showing but little tenderness, but the lump remaining: neither ripening nor lessening in size. It will never disappear unless made to come to a head.

As long as the animal can be worked with a collar cut out to relieve pressure on the part, he had better continue to be useful, and when no longer able to do so, and an increased sensitiveness is observed, an attempt should be made to form matter, by the injection into the body of the swelling of some irritant, such as spirit of turpentine, by means of a puncture first, and the introduction of a sharp-pointed pewter syringe. Such treatment commonly results in proper formation of genuine pus, and we have then an ordinary abscess to deal with, in the manner above advised. The healing process is generally rapid in all pus abscesses, when once the matter has been liberated, but amateurs are warned against premature lancing, as well as funkiness; a bold slit in an upward direction being free from danger, and favoring the complete evacuation as well as subsequent cicatrization of scarring over of the skin.

Serous Abscess, we have said, consists of watery fluid, not pus. Those occurring on the inner aspect of the dog's and cat's ear may be taken as typical, and the treatment applied to other parts. A sudden swelling takes place under the thin skin, and a round and painful bulge is seen. It is painful in this situation because of the unyielding cartilage behind it, but on fleshy parts is much less so. The amateur, however bold with the knife in other cases, invariably bungles an ear flap serous abscess, because he only pricks it and lets out the fluid which is so ready to escape even through a small orifice. A thin skin, like that inside a small bird's egg, is present, and from this cyst, fresh fluid is secreted in a few hours, while the wound as quickly heals up. The fluid this time is thicker and changed in character by reason of admission of air, and if the case is let alone, consolidation takes place and withering of the ear flap, on account of the pressure on the blood-vessels supplying the parts with nourishment. It should be boldly slit open the whole way, and a crochet-hook or fine pair of forceps employed to pull out the membrane whole; then it will heal with very little puckering or contraction, perhaps none whatever. An indifferently evacuated serous abscess will always have this tendency to refill, particularly as regards animal's ears, and it then becomes necessary to inject tincture of iodine daily or else sew down the inner skin to the cartilage to prevent union until all discharge has ceased. This treatment is very painful and much resented by dogs and cats, and it is therefore much more merciful to operate boldly in the first instance. One need hardly apologize for repeating a warning given in another part of this work about using the knife or lancet: it is to say that a knife employed with its cutting edge *outwards,* may be used where abscesses have to be lanced in dangerous situations, as upon joints. A thorn or a blow may cause suppuration, or a serous abscess upon the hock or knee or fetlock, and a knife struck into it may do fatal injury, but used as above advised will be perfectly safe.

Galls from Saddle and Harness.—What a nuisance these are! How many disappointments result! It may be said at once that they are generally avoidable if proper care is taken of linings and padding. The man who rides a horse with the pommel or the cantle of his saddle right down on the animal's spine, deserves trouble, in order to teach him how to be a good horse master. Better spend a dollar with the saddler than twenty with the doctor and lose a horse's services for a long time. If an animal flinches over the withers or other situation it calls for immediate investigation. It may be that a warm fomentation, followed by an alum lotion, will put the matter right; when repetition of the injury will throw him out of work. Periodical inspection of collars, saddles, harness pads, and cruppers, should be made. The simple practice of cutting out a collar or pad will often serve to keep the animal at work, but it more often fails, because the man does not provide for shifting of the gear. If a saddle is the offending body, a crupper strap should be put on the "D," provided for that purpose, but rarely used, or the crupper of the harness horse taken up a hole or two. It is with collars that most people fail, as they forget that these will take a different direction when going down hill, and first fall forward, and then back, and it needs no heavy one to break the scab and increase the injury. The simple expedient of a long strap or even a leather boot-lace affixed from the hame terrets on either side, to the saddle pad, prevents this undesirable movement.

Many galls are caused by the practice of taking off gear immediately a horse comes in from labor. It should be simply raised and replaced a little aside, so as to prevent too rapid evaporation, and removed when the animal has cooled down.

The unsavory custom of applying warm urine is objectionable only on general grounds: that it has a beneficial effect can scarcely be doubted by those with experience of the practice. Alum is the best of all applications, and a cheap method of making a saturated solution is to place a good-sized lump in a large bottle full of water and keep refilling it until no portion is left. An inflamed and angry-looking abrasion may well be painted with a mixture of one part pure carbolic acid to fifteen of collodion, or equal parts of glycerine, and compound tincture of benzoin, but we have always to remember that drying, and not softening, or emollient remedies, are desired for the ultimate hardening of the skin. There are horses so sensitive by nature that they can scarcely be kept from galling, no matter what pains are taken, and for such we had better make up our minds to a blister, such as one part of biniodide of mercury to ten parts of vaseline or lard, and if necessary, repeat this when a spell of rest is expected. If the reader will refer to the subject of Blistering and Firing, the explanation for this measure will be found.

Sitfast.—One of the results of undue pressure under the saddle or collar is known by the above descriptive title. It does indeed *sit fast.* It is dead around the edges, and these soon have a dry appearance, then begin to curl up and leave an inner portion more or less round in shape and apparently sound. No cure can be effected until the whole of this is detached. The apparently severe plan of cutting it out boldly will save the animal much suffering, and promote an early cure, as it is then a comparatively simple process of granulation and cicatrization. (See Wounds, at page 295.) One sees folks poulticing and softening with fuller's earth and glycerine, with ointments and disinfectants, which can only hinder the disintegrating process required. The most successful practitioner for this disease the writer ever knew, was a stable loafer, who described himself as a "specialist" and "drew" sitfasts at a "quarter" a time, or a shilling of English money. He fastened his teeth well under the sitfast, and then let the horse drag him about until the portion came away. A kinder method is to soak the sore with a ten per cent. solution of cocaine, and six or eight minutes later cut it out with a good sharp scalpel.

Fistulous Withers.—Bruising of the withers, the shoulder, or other parts by saddlery, often leads to injury of the deeper-seated tissues; the ligaments and dense fibrous tissue of the spines of the vertebræ which are here most prominent. Instead of the death of the skin as described above (sitfast), there is destruction more or less complete of tissues under it. The inflammation thus excited leads first to swelling and the formation of an abscess, and later of a fistula or piped wound which Nature establishes for the purpose of draining away the dissolving materials she cannot tolerate. Whether a fistulous wound is established by the presence of a bullet, a stake, a thorn, a wire barb, or by dead or dying tissues, the same condition is set up, and there is no real difference between poll evil and quittor and fistulous withers. A fistula or sinus wound it is, and its purpose is to afford egress to matters which must be got rid of. The discharge is of a variable consistence, and profuse at one time and scanty at another. Some genuine pus escaping, will mislead the inexperienced practitioner into thinking that it is healing by granulation, but a portion will still be discharging frothy or watery or sanious matter mixed with the genuine or laudable pus which indicates true repair at the bottom of the wound, and no attempt should be made to mend the skin until assured of sound tissues under it.

Treatment.—Destruction of the pipes and sloughing out of the offending substance is the principle on which all fistulous wounds should be treated. (See Poll Evil, at page 299.) The

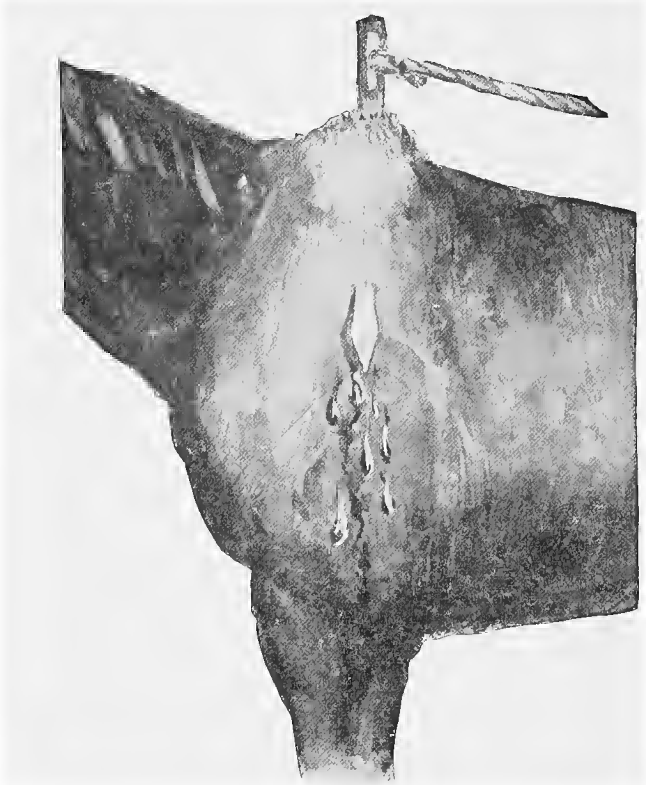

FIG. 32.—PUTTING A SETON THROUGH FISTULOUS WITHERS.

withers lend themselves to setoning better than some parts, and the most successful method generally is to introduce a broad tape or stout card by means of a seton needle of some length into the orifice at the top, and bring it out an inch or two below the bottom of the swelling. This may be dressed with arsenical paste or a saturated solution of chloride of zinc, or with turpentine. The two former are more destructive of the tissues with which they come in contact, and the latter provokes a boil or suppuration: the object being to carry away the substance doing the mischief, either by sloughing more tissue and enlarging the drain, or by drawing it into the greater discharge provoked by the turpentine. Frequent renewal of the dressing and turning of the seton is necessary. When the seton brings out nothing but thick yellow pus, and this has a disposition to dry around the wounds, and no scalding continues from a trickle of more fluid matter on the skin below, it is time to cut off one knot and withdraw the tape, clean the surfaces, and look for healing. Syringing through with any simple disinfectant will clear the road. Fistulous wounds often disappoint us, the little sinus forming again, with one side of the mouth puckered or pulled down in an unmistakable manner to those who have once carefully observed their construction.

Acne, or German Measles, in Horses.—Among the troublesome lumps and bumps that horses get may be mentioned acne. They are in the nature of blind boils occurring on the faces of young people and are caused by saddlery and harness conveying infection from one animal to another. Their number and frequency and the spread throughout a stable is the chief thing which enables us to distinguish them from the non-infective swellings which are prone to come under a tight-fitting bridle, or a collar too big, or too little, or an ill-fitting saddle or harness pad. The face of most old harness horses will be found to have one or more of these hardened lumps which were first of the blind boil type, and finally became solid fibrous or fatty-fibrous tumors.

Treatment.—Wash the saddle and harness with disinfectants that will not do damage. Carbolic acid pure, and glycerine about five per cent., answers the purpose as well as any. There is no lotion or salve that will quickly cure these lumps and bumps, whether of infectious origin or caused by friction, and the most satisfactory plan in the end is to puncture each individual pimple and force a drop of neat carbolic acid or of turpentine into the body of it. I prefer turpentine, because it is equally effectual in destroying a parasite and in provoking a pus formation. When this has been broken or squeezed out, the little ulcer remaining is of a healthy character, ready to granulate and heal over with a good cicatrix which will not show. Turpentine is one of the good remedies that have been pushed aside in obedience to fashion: there being always among us a number of veterinary Athenians who "love to hear or to tell of some new thing" and forget the Pauline advice to "prove all things, and *hold fast that which is good.*" The sweating out plan adopted by European horse dealers consists in clothing very heavily, and exercising sufficiently to cause profuse sweating: thus inducing such a superficial hyperemia that pustules are disposed to form and bring about the results above named. It is a good plan where the numbers of pimples are too great to be dealt with individually, and in the case of horses not working for a living, but in preparation for sale and with men to properly disinfect polluted rugs.

Itching.—In the previous pages some of the principal causes of itching have been described, but there are many cases of skin irritation to which long Latin names are applied but whose real nature we do not understand. Many pet dogs become a nuisance through their habit of scratching, and nothing definite in the way of skin disease can be diagnosed. Some undoubtedly do it for amusement, although the habit began in real irritation. A frequent cause of rubbing about the head and withers in horses is dried sweat. The salts accumulate and act as a layer of salt rubbed in would do, plus dirt and débris. Those owners who are indifferent to the comfort of their slaves may be induced to wash off dried sweat and clean linings of harness if they are reminded here that many serious accidents have resulted from rubbing off the bridle when annoyed by itching. The sore caused by harness offers an invitation to flies. The practice of medicine is still largely empirical and we may often treat these itching troubles without fully understanding their pathology. Some will be allayed by unctuous materials such as vaseline, lard, lanoline, carbolic oil or olive oil: others will be greatly benefited by dilute glycerine—five or seven per cent.—but the writer has frequently scored on chronic cases when all else has failed, by making a lotion of one ounce of freshly-prepared sulphurated potash, two ounces of glycerine, and a quart of water: applying it with a sponge to small surfaces, or making the medicament in gallons, and brushing into the skin where large areas are affected.

Itching Legs.—The two chief causes of rubbing one leg over the other in the stable have been described under the headings of Leg Mange and Grease, and the reader is invited to consider the probability of the trouble being due to symbiotes, as the writer has found so many cases of it among feathered Shires, and never a client who suspected the true cause.

Itchy Tail.—Rat tails, as bald ones are called, are very unsightly and generally originate in neglect to remove the thick scurf which ordinarily accumulates under coarse hair, or else from the irritation of parasites in the rectum which provokes itching and for which the horse can think of no remedy but pushing his rump against the wall and rubbing his tail. Whip-tailed dogs, such as bull terriers and Manchesters, often lose the covering of hair by lashing the caudal appendage against solid objects. Some will cause wounds in this way which are difficult to heal, and eventually necessitate amputation. If a horse or a bullock rubs his tail and rump, the outside parts should first be examined, and failing to find any cause, a little mercurial ointment should be introduced into the rectum and an enema employed to wash out parasites which accumulate here. (See Bots in Horses, at page 407.) If scurf has caused irritation or itchy tail in a horse, the member should be first washed with plenty of soft soap and warm water, and when nearly but not quite dry, it should be held up while the following lotion is applied, in a manner to run down the hairs and onto the skin, not off the hairs and onto the ground, as will be the case if any lotion is applied with the appendage hanging down.

Hydrocyanic Acid	2 drams.
Liquid Potash	4 drams.
Water	1 quart.

It may be necessary to bandage the tail or have an unsightly leather bucket made to protect the member from the habit of rubbing.

If a sheep rubs his tail we should look for maggots or fly-struck spots, or for festering under it, when diarrhea has led to an accumulation of filth and the tail has become adherent to the perineum. This latter accident sometimes happens to long-haired dogs, and they need to be patiently bathed until the malodorous mass can be detached by hand, the hairs combed out, and the sore skin anointed with cold cream or spermaceti ointment, or other simple emollient.

Itching Ears.—The larger animals are seldom troubled in this respect, but dogs following horses and vehicles are subject to dust, and an irritation is set up which causes genuine otitis or inflammation of the ear. It begins by itching, and the dog applies his usual remedy—a hind foot—which adds to the grief.

Such cases cause intense pain until a discharge pours out of the meatus and is often mistaken for canker, and some caustic remedy, mistakenly applied, leads to the real thing. The sufferer should be given an aperient dose of oil, and the ear syringed out with soap and warm water, and carefully wiped with a soft towel, before filling the meatus with the zinc ointment, to which five per cent. of pure carbolic acid has been added. A few applications will usually suffice, but the function of the ceruminous glands is imperfect for a time, and should be aided by lanoline or other natural fat to keep the inner skin soft and pliable. The ceruminous sebaceous glands in animals' ears produce a secretion which not only protects from flies and foreign bodies, but lubricates the appendage for movements long since lost to human beings, whose ear muscles are little more than vestigial remains, and who only "wag their ears" metaphorically.

Fistula of the Ear.—This is met with in horses and dogs, occasionally in other animals, and is probably due to external violence. The sinus runs down from the little loose flap or false ear between the skin and cartilage, and its branches often spread around the root or base of the appendage (not the true ear or auditory apparatus).

Treatment is the same as for quittor, fistulous withers, or poll evil, which see at pages 289, 299, and 343.

Wounds.—There are fewer animals unnecessarily sacrificed to blood poisoning through wounds than formerly, as the public has some knowledge of disinfectants, but there is a regrettable ignorance still of the principles of treatment. The teaching of first aid is admirable, as far it goes, but it always implies the attendance in a short time of the doctor, who will take up the case and relieve the first aider. In veterinary treatment we need more. Economic reasons make it desirable that animal owners should be able not only to give first but last aid, and attend to the treatment of wounds all the way through, unless they are fortunate enough to have a cheap contract with a veterinary surgeon, or able to afford professional assistance without regard to expense.

Wounds readily lend themselves to simple classification, and the principles are easily understood.

Clean-cut or Incised Wounds, Contused Wounds, Lacerated Wounds, Punctured Wounds.—These are convenient divisions into which to divide the uncomplicated ones involving joints or injuring internal organs. By incised we mean those clean cuts from a knife free of extraneous matter, as when the bread knife slips and cuts flesh instead of fodder, or those made by the surgeon with an aseptic instrument. If such an injury is promptly treated by bringing the lips of the wound together, the probability is that the plastic material thrown out will unite the parts by simple adhesion, or adhesive inflammation, which is quite a different process from the next to be described. The amateur is specially warned against the almost universal practice of washing a clean wound. This is offering an invitation to those unseen but myriad germs floating in every atmosphere, to enter and produce their ill effects. Even when the water used is mixed with a disinfectant it delays union, and encourages the loss of blood, which should be acting as a clot to join the divided structures. This remark does not of course apply to any wound, however small, where there is the slightest suspicion of foreign matter being introduced, as upon a knife that is dirty. The man who is skinning a carcass and cuts his hand had better view it as infected, and treat it freely with a disinfectant although postponing repair. He will be choosing between delay and possible poisoning. Of two evils, then, let us choose the lesser.

Any method by which the lips of a clean cut can be brought into apposition and retained is a good one. Binding up in the blood with a clean rag in the absence of lint or antiseptically prepared fabrics will serve in most cases. The size and extent of the wound will decide us generally as to the use of plaster, stitches, and bandages. We have discouraged bathing and irrigation of clean wounds, but in practice we have found that carbolized oil is a good thing to apply to any fresh wound whether superficial or deep, short or long. It prevents the entrance of septic and other germs and after a slight preliminary smart deadens pain, makes the wound comfortable and prevents sticking of the material applied as a bandage. It has been elsewhere advised to keep a bottle of this lotion where every member of the household can find it, for his own use or for application to the live stock, and the writer makes no apology for repeating this recommendation here. Rest is all that the clean incised wound needs.

Failing this simple union, repair will have to take place by suppuration. The wound which perhaps united at first breaks open because organisms have entered, and now there must be pus formed before final union takes place. Under the yellowish-white matter little mushroom-like bodies are being formed called granulations, containing miniature arteries, nerves, veins, etc., and when they have filled up the cavity, the surface will dry off and a scar or cicatrix be ultimately formed. This scar is composed of dense fibrous tissue, not new skin. No new skin is ever formed under any conditions whatever, not even when gallant students at a hospital supply portions off their own arms to replace the damaged integument of a distressed damsel. The simple incised wound may have been of such extent that sutures or stitches have been necessary to bring the edges into apposition. If they have been left in the flesh more than about twenty hours, they will induce suppuration, which may or may not extend to the actual cavity of the wound. It should therefore be known that the lips that have been kept in apposition for one day will ever after have a disposition to come together precisely opposite the stitch marks. The good surgeon will remove very carefully any sutures he may have put in if he finds next day that simple adhesive union has taken place, but in other classes of wounds where suppuration or mattering is bound to take place, he will keep in his stitches and obtain from them all the benefits to be derived from keeping the surfaces together. The material employed for sutures may vary from the finest silk to stout string, and all should be soaked in a carbolic acid lotion of five per cent. strength, or other suitable antiseptic, unless one is fortunate enough to have the well-prepared suturing materials supplied by those firms who cater to surgeons. Deep wounds need deep sutures which will not tear out when swelling follows. They cause no more pain to insert, and act much better than superficial ones. Fine stitches are for skin wounds such as torn eyelids.

Contused Wounds.—Contused or crushed and broken open, such as may be caused by a blunt instrument, or a bad fall. Broken knees are often contused wounds. They may be lacerated too. They are of great variety, but the crushing or severe compression of the tissues is liable to result in their death, and in any case acute inflammation.

Treatment is directed to the promotion of circulation by such measures as warm fomentations and poultices according as the situation will permit: the latter affording more lasting benefit. If the congested vessels can be got into action again, the parts injured will not die and slough away. Treads are examples of contused wounds, where the iron shoe with great force has come down upon the coronet of the opposite foot. Considerable time must be allowed for the repair of wounds of this class, and after the preliminary treatment above suggested, they will need much the same measures as have been recommended for suppurating wounds healing by granulation. The surgeon will fully assure himself that a portion of tissue is actually dead before attempting to remove it: always conserving every particle of skin that may be retained. Sloughs or killed portions must be detached and removed before healing and scarring can take place. Wounds of this kind will often hang fire, as it is said; making progress up to a certain point and then remaining pale in color, and assuming the character of an indolent ulcer for want of active circulation and the reparative materials which must necessarily be brought to the spot by the blood. They may be then stimulated by a lotion of five per cent. copper sulphate, or lightly run over with a feather dipped in black oils. (See Ulcers, at page 254.)

Lacerated Wounds.—Torn and having portions of skin and perhaps of muscle and tendon hanging loose, is meant by lacerated.

This sort of injury occurs when animals are caught in machinery or hang up on rails when jumping, or nails are left in stable walls. Unless contused as well, the chief thing to be attended to is washing them with a weak disinfectant to free from dirt, and the careful preservation of every atom of skin by drawing together with fine stitches (see Torn Eyelids, at page 388), protection from further injury by rubbing, when the itchy period arrives, and removal later of any dead portions, as in the case of contused wounds.

Punctured Wounds.—These are commonly small at the orifice, and whether deep or not, are always to be deemed serious. Better a large incised wound than a small puncture from a stable fork or hedge stake. Pricked foot in shoeing is a common form of punctured wound. Not only the difficulty of efficient drainage presents itself, but any septic material carried in will be retained when the swelling has blocked the passage. Before the true nature of tetanus was known, the disease was always feared when punctured wounds took place. Rusty nails and dirty stable forks are extremely likely to convey such organisms. (See Tetanus or Lockjaw, at page 51.) The principle of treatment is to obtain drainage from the extreme end of the wound. A primitive but successful method is that of pushing in a red-hot iron. It seems barbarous, but has the recommendation of being truly aseptic. (See Castration, at page 368.) It prevents too rapid closure, and promotes a discharge. A more scientific plan is to probe and syringe and push up a plug of tow dipped in turpentine, in chloride of zinc, or other strong dressing: leaving an end out, so that it may be easily recovered and renewed until healthy matter is produced and healing allowed. If wounds of this kind occur under the shoulder or thigh and take an upward direction, drainage is of course favored, but in some situations there is a disposition to pocketing or the formation of matter in dependant spaces, or in loose areolar tissue, such as is found where the limbs are attached to the trunk. When these are below the level of the wound, drainage is practically impossible, and fistulas are very apt to follow. These will have to be "bottomed" if ever the wound is to heal, and for this reason alone a punctured wound should be considered dangerous and kept open by one or other of the means mentioned. Too rapid closure and cessation of discharge while the adjacent parts remain swollen may be taken as a bad sign.

Poll Evil.—Bruises upon the parts immediately behind the ears, whether caused through striking a low doorway or by a heavy collar or blows from a whip-stock, are liable to result in abscess at this part of the horse or mule. A tenderness about the head, running back when the bridle or collar is about to be put on: swelling of the part, the formation of matter: its rupture, or release by the lancet, and the formation of a pipe or sinus: these are the symptoms, and course, which end in so-called poll evil. A fistulous wound in this situation is difficult to deal with because so many dense fibrous structures are here united, and the matter underruns them, and drainage cannot be obtained. A fistula at the withers can be drained by a seton, but the poll is wide and the direction of the sinus often such that it cannot be so operated upon. If the horse is secured and an attempt made with the probe to find out the course and direction of the sinuses, one soon comes upon an impasse while feeling assured that the wound is much deeper: indeed it spreads

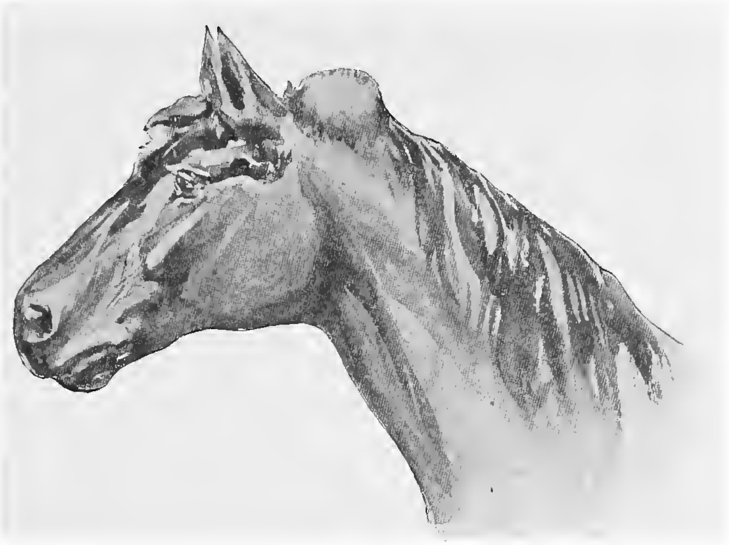

FIG. 33.—POLL EVIL.

like the roots of a tree in an old-standing case. There is some dead or dying tissue to be got rid of, and the place will never heal until the slough is cast out. A practice which appears more dangerous to the anatomist than to anyone who knows not the proximity of the spinal cord, and the one place in the vertebral column where it is exposed, has proved the most successful. It consists in pushing down into the sinus or pipe, a strong corrosive mixture, which has the effect of destroying a lot of tissue and producing a great slough or core, which comes out after a while, and with it very likely the offending material. Many things are used, but a mixture of arsenic and corrosive sublimate and sulphate of copper in equal parts by weight is a favorite. It is often wrapped in tissue paper and twisted in the fingers to the shape of an arrow-head and then rammed home with a flat-pointed stick or whalebone probe. The poor beast suffers very great pain until the slough is detached. Daily syringing with a ten per cent. solution of chloride of zinc lotion is the practice of others, while one of the most successful American practitioners plugs the sinus with a strong biniodide of mercury blister. (See Blisters, at page 466.) Whatever method is adopted, the object is the same. (See Fistulous Withers, and Quittor, at pages 289, 343.) Except during the process of abscess formation, which we have said precedes the fistula, a horse may be worked without adding to his trouble, if a breast collar is used and the bridle so arranged as to have no poll piece that will come in contact. Cut collars with a strap may be used.

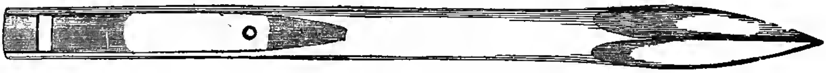

Fig. 34.—Seton Needle.

In most districts where work horses are kept, there is to be found a man who makes a specialty of this kind of work, and if a contract can be entered into with such a one, it is usually the most satisfactory way out of poll evil and fistulous wither.

Broken Knees.—This term is applied to any damage sustained to the skin or subjacent tissues where the bended joint comes in contact with the ground. It may be but a slight abrasion, upon which the hair will grow again, a graze that takes off the outer layers: a cut that goes through the skin: a contused and lacerated wound (see Wounds), or involve the tendons and bursa: cut through the capsular ligament which holds the joint oil: or be complicated by fracture of a bone or bones. Every degree of damage then may be sustained by a horse falling on his knees, and however little real injury may be sustained, his value will be depreciated if any blemish is left. Although there may be no scar, the veterinarian will detect coarse, cross-grained hairs, and a slight thickening, which tells him a tale of grief he will deem his duty to communicate to the purchaser when he is acting as examiner as to soundness.

Blemished knees are objected to for several reasons. First, they suggest fault of action which may bring him down again, and secondly, restricted mobility through the contracting process in re-union of tissues never elastic (tendons and ligaments), and thirdly, the blemish that everyone can see. The most sure-footed and those with perfect action may meet with this accident, and, provided the legs are put on right, the poor man who wants a good horse cheap. and must necessarily have to accept some defect, will do worse than buy one with blemished knee. If the toes turn out and evidence of brushing exists at the fetlock, or of speedy cut below the knee, or the animal has a heavy forehand, and a daisy cutting action, he should be rejected.

Treatment.—In any but the most superficial and slight scrases there will be bruising of the joint, and in the wound, dirt or foreign matter. It is desirable to reduce the effects of the former by fomentation, and remove the latter by similar means: perhaps by syringing somewhat forcibly between the tissues when the tendons are exposed and grit is apparent or suspected. As the accident almost always occurs away from home the horseman should not be tempted to wash the wound at the nearest stream, or accept a loan of the stable sponge at the nearest hostelry. If he cannot obtain a suitable disinfectant, he had better walk the animal to its destination: such movement favoring the extrusion of dirt although undesirable for other reasons. If a journey, short or long, has to be undertaken, it must be begun at once, and before the subject gets stiff. A five per cent. carbolic lotion, preferably warm, is as good as any for the cleaning-out business. Then a voluminous poultice should be applied that will soothe and promote circulation in the bruised parts. (See Poulticing, at page 264.) Poulticing should only be continued long enough to ensure the removal of grit, and the commencement of suppuration, or it will later induce soft granulations and a disposition to proud flesh, as this reparative process is called, when the red eminences are too luxuriant. Proud flesh is not an unhealthy product of a wound, but a natural process of repair by which spaces are filled up. It is the business of the surgeon to first induce its formation and then control it. (See Treatment of Cracked Heels, at page 263.) When the wound is nearly filled and before the highest eminences have quite approached the level of the skin, we should begin to use a deterrent. The healing will be retarded by a few days, but a more satisfactory result will be obtained. Instead of a spongy growth, and a lump on the knee, we shall keep it level by daily application of such a lotion as the following:—

Chloride of Zinc	1 dram.
Tincture of Myrrh	2 drams.
Water to	6 ounces.

If, after a few days of this treatment, the wound is practically level with the skin, and we have left it uncovered to promote evaporation, we may now proceed on lines intended to leave the least possible blemish. Our object is to bring the edges of the skin together and prevent any prominence. Over the red, raw surface we stroke a hardened caustic point (nitrate of silver or lunar caustic). A few minutes later, this will blanch the tissues touched, and next day a dry, blackened scab will be found. This is to be roughly removed: rubbed off, in fact, not lifted, and the bleeding surface again lightly cauterized, with results similar to those of yesterday. An interval of two or perhaps three days may then be desirable, while the contracting scar is pulling the skin from all directions to cover the space. Each time we remove the scab, a smaller one forms: each time the skin more nearly approximates, until the final scar or cicatrix of shining, dense, fibrous tissue represents the permanent lifelong blemish to be accepted by the owner. A lot of nonsense is talked about making hair grow on bald knees (and on bald heads), but nothing will induce it to come again if the hair bulbs or roots have been destroyed, and nothing will be needed to do so if they have not. The treatment above indicated is for an ordinary case of broken knee, where some skin has been crushed and torn away, and the other coverings of the joint more or less exposed. If portions of lacerated tendons are hanging down, they should not be cut off, but the poulticing continued for a longer time to induce the irreparably damaged parts to slough out.

If the knee joint is opened, the animal will seldom be of any further use, unless as a brood mare, and expense will be saved by slaughter. A little synovia from the injured bursa may be mistaken for oil from the joint, and in the absence of professional advice the owner will do well to wait for the appearance of a yellow, strong smelling and unmistakable discharge before signing the death warrant. The lost bursa will not necessitate destruction of the patient but will detrimentally affect the mobility of the knee thereafter. Deep-seated injuries and fractures make themselves known by breaking out at the back of the knee, and offer but poor prospects of recovery. Syringing with a three or four per cent. chloride of zinc lotion is the most likely treatment to succeed, but a surgeon should undertake or at least pronounce upon such cases.

CHAPTER XII

DISEASES OF BONES

Ringbone.—A bony enlargement situated upon either or both of the pastern bones (suffraginis and corona) is called by the above name, although it may not form a circle round the bone; indeed it may be a spot or trifling ossific deposit and yet come under this appellation. It consists of bony material deposited upon bone: an exostosis or growth of bone out of bone, and differs in this respect from so-called sidebone. (See Diseases of the Foot, at page 338.) Spavins and splints are also exostoses, and all are brought about by inflammation of the periosteum or covering of the bone, from which its outer layer is maintained by blood circulating in it. Periosteum has the power of selecting those elements from the blood which are employed in bone building. It is inflamed by strains or blows, its function is exalted, and deposits of bone are made. Such ossific deposits occur at all sorts of places where inflammation has been provoked, but the frequency with which they are found on the cannon and splint bones, and hock, and the resultant lameness, temporary or permanent, have given to them special significance and a nomenclature more or less descriptive—*less*, perhaps, in the case of ringbones which do not form rings.

Ringbones affecting animals not employed for labor are of comparatively little importance, and our remarks will therefore apply only to horses and mules, and possibly asses, but the writer's wide experience does not include a single case of ringbone among the latter. There are certain conformations which predispose to ringbone, and a very decided hereditary tendency. Pasterns that are either too upright or too long, favor the deposit of bony matter, when it appears to be produced to give strength. (See Splints, at page 306.) Immature animals worked too hard and badly shod are very liable to ringbone.

Symptoms.—Lameness may accompany the inflammatory condition which precedes the deposit, or the growth may be so gradual as to attract no attention. Later, a careful examination will enable us to detect eminences or prominent portions interfering with the correct lines of the bones when normal. To correctly diagnose the malady in the earliest stages, one should have some knowledge of anatomy. It need not include familiarity with all the other structures of the pastern, but such education as the hand can acquire by feeling the legs and feet of horses whenever opportunity serves.

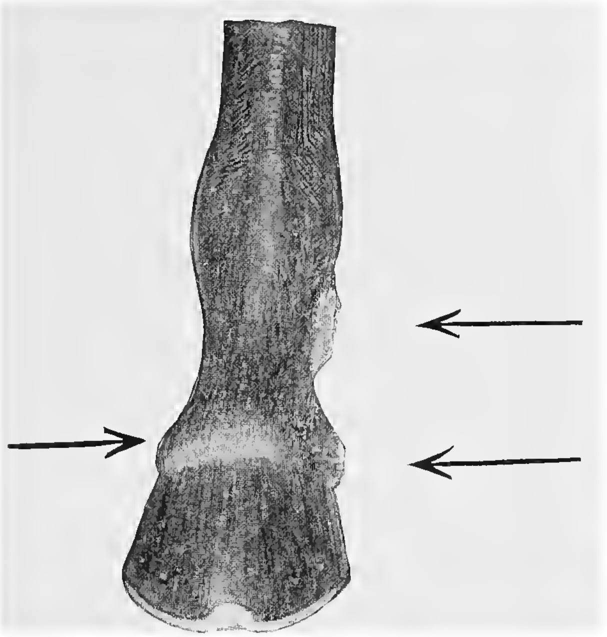

FIG. 35.—CUTTING AND BRUSHING AND RINGBONE.

According to the position of the growth, will the character and degree of lameness be shown. A distinction is often made between high and low ringbone, when it affects the long and short pastern bones respectively. If the short one, and the exostosis is more or less within the hoof, the lameness will be greatest, and the animal will bring his heel to the ground first, and endeavor to impose as much of the weight as possible upon that part. If the growth is behind the bone, he will try to relieve it by going short and putting the bearing on the toe: the fetlock joint being only partly flexed.

Treatment.—Work must be stopped; an aloetic ball given, and warm packs, hot fomentations, or poultices applied to subdue the inflammation and limit the deposition of ossific material. When quite cooled, an effort is made to excite absorption of the products of inflammation by blisters of various kinds. Biniodide of mercury in various proportions will usually answer best for bony deposits. (See Blisters and Blistering, pages 365, 466.) If repeated blistering fail to remove lameness, the firing iron is resorted to. This also may fail, and nothing is then left but to deprive the affected region of sensation, by the operation of neurectomy or unnerving (which see, at page 378). The writer's experience is very much in favor of the latter operation, as many horses have worked sound for years which were hopeless cripples before it was performed.

Splints.—Something like ninety per cent. of horses have splints upon their limbs, and the experienced veterinarian hardly regards them as morbid growths, but rather as stays which Nature has found necessary to put in to meet the needs of the individual horse. If they are more or less round, and situated towards the front of the limb, they seldom give trouble after being once formed, but such as occur on the posterior aspect of the splint bones, or the cannon and splint, cause injury to the soft structures and prevent the play of tendons or induce friction against ligaments. They more often occur on the inside of the limb, but some horses will have them on both sides and upon all four legs. The amount of lameness caused by splints bears no proportion to their size but depends upon their impingement upon other and more sensitive structures. They differ very greatly in formation, some being diffused, others in the form of a chain along the course of the splint and cannon bones, while those passing behind the cannon bone to the opposite splint bone are spoken of as pegged splints. If of the latter kind, or situated near the knee, they are deemed very objectionable, as liable to cause permanent lameness. In young horses first put to work or even without work, they develop at between two and five years of age, and may not infrequently be found in yearlings.

Causes.—Heredity plays an important part. Strain, concussion, blows, often self-inflicted by the other limb, and too early breaking and carrying or drawing weights disproportioned to the strength of the animal. Conformation has much influence in the production of splints; the long legged but small boned or weedy horse, such as often results from a cross of thoroughbred with a cart mare, will gain strength by a number of exostoses when his body weight is found too great for his spindle shanks even while unbroken and subject to no concussion or strain not incurred in amusing himself. The splint bones are extremely interesting from the paleontologist's view, being little more than vestigial remains of what once extended to the ground in the orohippus and the anchitherium.

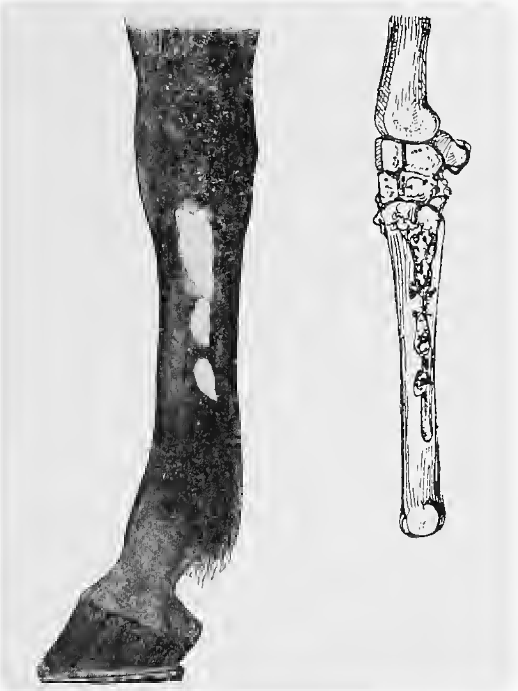

Fig. 36.—High Chain Splints.

Symptoms.—They are not always to be seen, and some of these causing lameness are not easily detected even by experts; such, for instance, as those originating between the splint and cannon bone and taking a backward direction where they will be covered by ligaments and tendons. When a horse is lame and splint is suspected,

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the limb should be flexed, and while holding up the foot with one hand the fingers of the other can push aside the now relaxed structures and perhaps feel the splint, or some heat or tenderness indicating the nature of the trouble. When trotted on hard ground, splint lameness makes the animal throw the limb somewhat outward and gives the impression to the watcher that the knee is not properly bent.

Treatment.—Immediate release from work, a dose of " physic " (see Physicking, at page 363). Cold applications, as the hose, or an evaporating lotion. (See Lotions, at page 470.) It is well to give the cold treatment at least a week's trial, and if the lameness is quite gone and no bulge is felt at the seat of trouble, it may not be necessary to do anything else but rest the patient for another two or three weeks. If, on the other hand, there is still some loss of mobility and a suspicion of lameness, it is desirable to apply a small blister which shall include an inch around the obviously affected part. One in eight of biniodide is generally suitable for this purpose. (See Blisters and Blistering, pages 365, 466.) While recovery is almost certain, there are a few cases in which lameness persists even after puncture firing and repeated blisters and periods of rest. For such, an operation is occasionally performed known as periosteotomy or cutting through the periosteal membrane, which we have said is the bone forming investment from which the outer and denser layer of bone derives its elements and by which its life is maintained. Splints, spavins, ringbones, and other exostoses are examples of exaggerated or perverted nutrition, resulting from an excess of blood, which excess or inflammatory condition is brought about by strain and concussion; conformation and heredity contributing important factors.

Spavin.—Horsemen speak of bone, bog, and blood spavin. The first is a bone disease, the second a distention of the joint, by bulging of the capsular ligament containing the synovia, and the third refers to a more or less varicose condition of the vein passing over the spavin region. The seat of spavin must be known and the contour of a normal hock impressed upon the mind in order to appreciate the significance of spavin. (See Fig. 37.) It is primarily due to inflammation of the periosteum, followed by deposit of ossific matter; a process which has been more particularly described in connection with ringbone and splint (see pages 304 and 306). The bony outgrowth upon the hock is generally preceded by lameness, but this may be of such a character as to attract no attention, or pass for stiffness due to excessive exertion, to jumping, or other unusual strain; an idea that is encouraged by the movements of the limb, becoming normal after a little exercise. Hocks of all varieties are liable to spavin, and they differ in shape and size and in the degree of lameness produced.

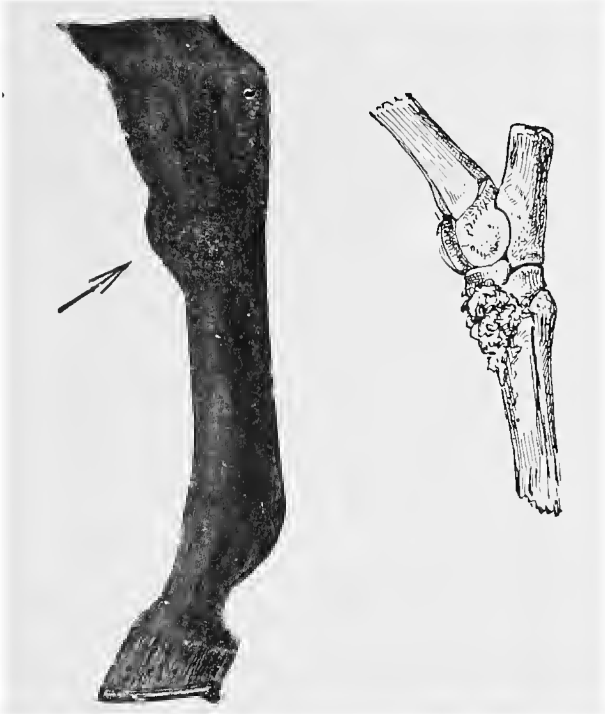


FIG. 37.—SPAVIN.

Causes.—All experienced horsemen and veterinarians are agreed as to the hereditary tendency. Those horses with upright pasterns and straight quarters are specially prone to spavin. Concussion and strain, the premature use of colts, and their continued employment when already fatigued or weak and out of condition, favor the development of spavin. Healthy hocks vary very much in different horses and one hock will often differ from another in the same animal. A so-called " coarse " hock, may prove the better one, but it is a matter of some difficulty to distinguish between coarseness and spavin. Disputes about hocks have given rise to much heartburning among buyers and sellers: to damaged reputations among veterinary surgeons: and to rich harvests among lawyers. Only by a post-mortem examination can some cases be determined. This was the course adopted by an eminent British veterinary, who was confident that he was right and gave a large sum of money for the animal in dispute: killed it: boiled out the spavined hock, and deemed himself well repaid when he displayed the bones to a Veterinary Medical Association. As a matter of fact it proved a good investment, for his opinion ever after was deemed the most valuable, and brought big fees.

Symptoms.—Lameness, more or less. With the subsidence of the periosteal inflammation this may pass off: or it may recur when the enlargement has the effect of tying the connecting ligaments. The action of a horse with spavin is stiff, and the hock appears imperfectly flexed. Looked at when trotted away from the observer, the defective limb will be seen to drop, while the animal dwells on the other. The toe of the affected limb shows more wear than its fellow.

Treatment.—The stiffness above mentioned too often misleads the owner and he fails to take the first necessary step of throwing the horse out of work, cooling him and preparing for physic. (See Physicking, at page 363.) Warm fomentations and hot bandages should be applied. The cold hose, or evaporated lotions are advised after a few days, and then repeated blisters. (See Blisters, at page 466.) The majority of spavins early and judiciously treated become set or inactive, and the parts get accommodated while the action is slightly but permanently altered. Spavined horses may remain good for life as workers although there is a disposition on the part of spavins to " wake up " on receiving special strain. In other cases intermittent or else permanent lameness results. Firing sometimes succeeds when repeated blisterings have failed, and division of the nerve of supply has answered in some but not all cases. (See Neurectomy, or Unnerving, at page 378.) A long rest at grass or in a big loose box is recommended in all cases.

Occult Spavin.—By this is meant ulceration within the joint. It is quite incurable.

Inflammation of Bone.—The exostoses referred to as spavin, ringbone, and splint, are results of local inflammation of the periosteal membrane, but the substance of the bone is in some circumstances inflamed (ostitis) and the lining membrane (endostitis). Scrofulous or tuberculous inflammations of bone occur in cattle, but in horses some form of external violence is generally the cause. It may be acute or chronic.

Symptoms.—Much heat, pain, and lameness: the animal snatching up the suffering member when pressed by the hand. Swelling follows, and an abscess ripens and breaks, and some portion of dead bone crumbles away and is carried out in the matter (pus) unless removed by the surgeon.

Treatment.—As the worst of nurses will be compelled to rest the acutely lame animal, we need not insist on its importance. To prevent separation between the periosteum and the bone and release the matter, we advise early and bold use of the lancet. Then the wound is syringed out with a disinfectant, and such further treatment adopted as we have advocated in the chapter on Wounds, at pages 294, 295.

Chronic Ostitis.—Those ringbones and splints and some other excrescences on bone which cause persistent lameness are often in a condition of chronic ostitis. The inflammatory changes result in the production of spongy and loose material, and of such composition are the jaw tumors of cattle, which must not be confounded with the glandular enlargements caused by the ray fungus and amenable to treatment. (See Actinomycosis, at page 56.) The small bones of the foot in tuberculous cattle are liable to take on this form of disease. Treatment is of little avail, and animals so suffering are better destroyed.

Necrosis and Caries.—The death of bone is spoken of as necrosis when any considerable portion dies at one time, and the term caries is reserved for such cases as decayed teeth, where there is slow but progressive ulceration.

Any treatment adopted must be based on the principle of removing the dead material, after which it may be possible to heal the parts. (See Inflammation of Periosteum, below, and Abscesses, at pages 285, 286.)

Portions of necrosed bone are frequently the cause of fistulous wounds (see Fistulous Withers, Quittor and Poll Evil), and every surgical method possible should be resorted to to remove them. In some situations where the knife cannot be used, a cure may be effected by introducing pledgets of tow dipped in hydrochloric acid, which has the effect of dissolving the mineral constituents of bone, and they then pass out in the discharge.

Big Head—Osteoporosis.—A soft, swollen and porous state of the bones of the head of animals is a constitutional disease in which the rest of the skeleton is involved. Much has been written about it, but practically nothing is known, either of its cause or cure.

Sore Shins—Metacarpal Periostitis.—Frequent in race-horses but of rare occurrence in other animals, and not so much due to hereditary tendency of the breed as to the very early training while the bones are still growing. Sore shins is a descriptive name in most cases, as it is down the course of the cannon or shin bone that the malady is generally found, but it may extend to the pasterns and leave bony deposits indistinguishable from ringbone arising from other causes.

The inflammation of the periosteum, diffused over a considerable surface, is essentially the same pathological process as that described in the production of ringbone and splint and spavin, and if not early and successfully treated, leaves deposits of ossific material which feel rough when the hand is passed down the leg. On the race-course and among steeple-chasers may be found horses with such masses of bony deposit that one wonders how it is possible for the soft structures to escape injury from them: yet some of these bandaged and booted veterans can hold their own against all comers.

Symptoms.—A change in the animal's gait: tenderness in going, shortened step, pain, and swelling of the shins, which increases and includes the fetlocks.

Treatment.—A youngster in training must be thrown out: at any rate for a time, for he will not stand it. As this trouble generally occurs when horses have engagements ahead, every effort may be made to recover them without being scratched. The following is the method usually adopted by British trainers:—Mash and physic (see Physicking, at page 363), off turf and on to tan: cold hose three times a day, or evaporating lotions. If with this treatment and reduced weight in the saddle the animal can go on with walking exercise, he may cool off so far as the shins are concerned and fulfill his engagements, but the owner will be all the time intending to throw him up as soon as possible. If from the first the attack is seen to be a severe one, hot instead of cold bandages will be applied while the physic is at work, but the patient will not be fit to run at an early date, as he will have to receive a mild blister (one in ten or twelve of biniodide of mercury), and this will probably be repeated in ten to fourteen days. As soon as the purge has ceased to act, much benefit is derived from iodide of potassium in doses

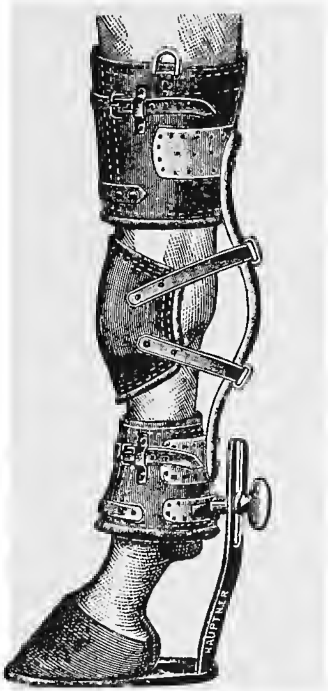


Fig. 38.—Leg Splint.

of 50 to 100 grains morning and night in the food, and continued for a week: then an interval of three days: and resumption of the medicament for another week: then a longer interval, perhaps a week, without the medicine, and again a final course of one week. By such methods many trainers have succeeded in keeping young horses going, and seen some of them win, only to be brought home for doctoring.

Fractures—Broken Bones.—In the case of animals we have always to consider the economic side. With us a favorable prognosis means more than a fair prospect of recovery: it must include such a one as will pay. The broken bones of animals have the same disposition to repair as those of men. Young creatures recover from fractures better than the old. “ Naturally so,” anyone would say, on reading this, but it is upon a consideration of such facts that a decision will be arrived at. Shall we try to cure, or shall we kill? Let us take the practical, everyday way of dealing with fractures, such as the writer has had occasion to advise upon for many years.

If called to a stallion, a gelding, a bull, or a cow, with a broken hind leg, there would have to be some special reason unknown to me as a veterinary surgeon, for attempting its cure. The horse would not be serviceable again for a very long time, if ever. He would carry the signs of his trouble. He would have a difficulty in leaping. The gelding would probably not be worth the outlay: having regard to the liability of some lameness being left. The bull would be with still greater difficulty restrained, because ruminants cannot be long supported by slings: he would waste in flesh, and a successor could be raised before he would again be efficient for service. The cow would lose her value as a milker: and all the difficulties of slinging, of wasting of the hind quarters, etc., apply to her as to the bull. Such are the common motives which make us “ vets ” advise slaughter as the choosing of the lesser evil. It requires no great gift of imagination to suppose the stallion owner willing to bear much expense and take great trouble on the off chance of obtaining another colt of such a get. Of the favorite gelding being doctored up that he may lead a happy life as a pensioner: of the priceless bull or cow whose strain it is so much desired to retain: so also with the commercially valueless dog and cat; a sentimental value will change our conduct. We have known a broken-legged mare to prove a little gold mine by breeding a good hunter foal year after year, and so it must be said that each case is to be decided upon on its peculiar circumstances. Sucklers, whether foals, calves, or lambs, are generally worth treatment.

Fractures are conveniently divided into partial or complete, simple, compound, comminuted, impacted.

By partial is meant a break in which the separation extends through a portion only.

A simple fracture is one not complicated by a wound externally.

A compound fracture is one having a breach or opening through the skin.

A comminuted fracture is one in which the bone is broken into more than two parts. It usually means, for practical purposes, a smashed bone: not merely broken into three or more pieces capable of reunion. We are not in this book sworn to any pedantic forms of expression and it is not essential that the reader should have academical knowledge of fractures in order to set them. He will learn here the chief distinctions which will enable him to decide whether to kill or cure. A bone that is broken, and one end driven into the other, is said to be impacted. In railway collisions and other catastrophes, bones are crushed into all sorts of unimaginable attitudes and conditions. There are transverse, longitudinal and oblique fractures met with in the ordinary way, and with these we have most to do.

In simple fractures there are two essential conditions for successful reunion and restoration to usefulness: the apposition of the broken ends, and their retention in such position. For this purpose we employ a variety of substances, after satisfying ourselves that the limb is not shortened and that the broken ends can for the time be held in position while our splints are applied. After these essentials, there are other things that make for success or failure, and animal doctors are always at the disadvantage that their patients do not co-operate with them, but frequently employ an abundant leisure or dispel *ennui* in tearing off appliances.

Whether the outer support or splint is to be composed of brown paper, scalded and molded; of corrugated packing paper, card-board, starched or glued bandages, strips of leather, gutta-percha, wood, tin, lead, copper, amalgam, or iron, will depend upon the amount of strength needed. You can set the canary's broken leg with the edging of postage stamps, and the weighty brood mare with a contrivance such as here illustrated and every thickness and strength between. Rag and tarred cord usually serve the shepherd's purpose. The trouble with broken bones is not so much in the setting as in the care to prevent sores. Most handy people finding themselves called upon to give first aid will succeed in putting up a fractured limb in a small animal, as a ewe, pig, or dog, but they always forget to put a large amount of soft material under the splints. The swelling that follows a fracture makes it practically certain the skin will be broken and much other damage follow if the parts are suffering compression. Antiseptically prepared cotton wool in sheets is the ideal thing for packing, but we have to make shift with what we can get very often, and any soft but clean material will do. We need not be too careful of removing splints either. Far better to do so than to allow a sore to go unattended. Nature's plan of uniting bones should be understood by those who would assist her. It is really quite a simple one, although commanding our admiration. When the breach occurs, there is bleeding: the blood forms a clot: the clot becomes organized: it undergoes slow changes by which it successively resembles jelly, hard boiled egg, gristle, and finally bone. When the last act is complete there is usually more than enough material; and like the builder's surplus quantities when repairs have been effected, these have to be removed. Much of our trouble with fractures is in the excessive amount of material or greatness of the callose. It is the fear of a bulging callosity which will interfere with the working of ligaments and tendons that makes us so often decide on slaughter at first; the owner sometimes arriving at that decision only when he has been at a lot of expense to prove what the surgeon pretty well knew. As a rule, the greater part—perhaps all—of the superfluous bony matter is gradually absorbed, and then perfect restoration is effected. Compound fractures are rarely worth treatment, although an animal may be of such value for breeding as to make it desirable to save the life. Irrigation with disinfectants and such treatment as has been advised for wounds (see Wounds, at page 294) should be accorded in addition to the support of splints. The difficulty is often met by cutting away enough of the supports or encompassing bandages to permit of syringing and removal of discharges. A very long time will necessarily be occupied in treating any fracture with wound, and the larger animals have to be supported in slings. Sheep, pigs, dogs, and cats, learn to swing the injured member, and to get up and down, as well as to seek their food, on three legs.

Fractures of the jaw and some of the facial bones occur without much displacement, and need only repose in order to unite. The lower maxilla is sometimes broken by the bit, and can be kept comparatively still by padding under a long-faced head collar, the noseband of which is strapped rather tight, but allowing the horse to suck up sloppy food which needs no lateral movements of the jaw.

Split pasterns are among the fractures which comparatively often occur without displacement. Repair commonly takes place. (See Lameness, at page 5.)

The writer has seen more than one example of a broken neck without sufficient displacement at the time to press upon the spinal cord and paralyze the animal. The last case was that of a draught-horse that came into collision with a vehicle in front while drawing a load of coal. There was a bulge observable on the neck about half-way down, but the animal reached home safely and only fell—never to rise again—when turning to enter the stable door. Then the displacement occurred which pressed upon the cervical part of the cord. Similar cases have been recorded by other practitioners.

Knocked Down Hips.—The antero-superior spinous process of the ilium, or prominence which the uninformed call the hip-joint—but is not,—may be fractured with comparatively little inconvenience to the horse or cow. It is not a joint but a bony process for the attachment of various muscles, and save for those connected with the extreme portion not much slackening on one side, or stretching on the other, is caused. Accommodation is soon reached, and only by comparing both " hips " from above or behind is one likely to see the defect.

Sprains or Strains.—Most people are familiar with the outward signs of strains, the swelling, heat, and tenderness, to say nothing of the incapacity that follows and endures for a variable length of time. Overextension is the chief cause of strain, or continuing to work structures already fatigued. If you are unaccustomed to ride horseback, to skate, or to row, you persist in the use of muscles after they are tired, and next day feel very stiff. The strain on muscular tissue has led to a greater blood supply being sent to effect repairs: a congestion or modified form of inflammation which is not destructive but constructive or reconstructive. The effect of the inflammatory process of tendons and ligaments is to soften them and render them more or less permanently deteriorated. Any treatment adopted is intended to prevent this continued softening. Wasting, as a result of sprain and disuse, is noticeable in muscle, and the atrophied shoulder which follows on strain at plow is a good example of rapid loss and equally rapid recovery. Every degree of strain is met with, from the very slight one, forgotten in a day or two, to that in which the tissues are strained to breaking point: some perhaps being actually broken. A " cure-all " must not be looked for in this connection, but an intelligent appreciation of the degree of injury and a sensible application of the principles or remedies which experience has proved good, may shorten the time and save expense in maintaining an otherwise useless animal.

Treatment.—In very simple cases, where only a little warmth and but slight tenderness is exhibited, a pack of cotton wool compressed by a bandage will probably effect a cure. In the rather more severe cases, we may add the use of evaporating lotions for half an hour night and morning, between the renewal of the packs and replacement of the bandages. A still more serious strain should be treated first by warm fomentations and poultices to promote circulation. (See Contused Wounds, at page 295.) Later on, the patient will profit by cold remedies which constringe the relaxed tissues, and finally by a blister that will excite absorption of inflammatory products. The vendors of popular embrocations would have us believe that everything can be accomplished by one process. It is not true. Most of these advertised oils consist of various proportions of seed oil, ammonia, turpentine, eggs, camphor, and acetic acid, and if rubbed in at the third stage, when a sprain needs something in the way of a mild blister, will do good, but they only add fuel to the fire when applied at first, and every veterinary doctor of experience will agree that his practice is enhanced by the employment of popular remedies which do damage, necessitating professional assistance, where, if warm and cold water alternately had been employed, the patient would have recovered without the medical man.

Liniments (see page 464) give the best results in muscular strains. For those of ligament and tendon, a biniodide of mercury blister is advised. (See Blisters and Blistering, pp. 365, 466.) The question of rest has been much debated. Almost all the recognized schools advocate a long rest, but the few men who have made themselves famous for curing strains, notably those of joints with long-standing adhesions, have adopted quite the opposite treatment. Both systems are reconcilable with what we know of physiological processes. Inflammation, as we have seen in connection with wounds, is the bringing of materials to a place needing repair. Absorption of superfluous products is the carting away of what is not wanted, when the work is finished. Both operations can be carried out deliberately, or hurried by putting on extra hands. The man who works with a tight strap round a strained wrist hurries up the process which would take weeks instead of days to accomplish if the injured member were carried in a sling. Working the strained wrist causes the man very great pain, but many blacksmiths and others have the physical courage to endure this, although wanting in the moral courage to be temperate and keep a week's money in hand. In most countries there now exist societies for the protection of animals (and incidentally for the amusement of busybodies) which prevent us from adopting the "work it off" system of treating sprains and some other ailments, where both they and their owners would ultimately benefit. As practical men we have therefore to consider how to keep the subjects of strain in an economic manner if they will ever repay us for the expenditure.

Strain of the Back Tendons.—There is no difficulty in the diagnosis of these, as one or both (perforans and perforatus) will be felt to be enlarged, hot, and perhaps tender. The latter is not such an invariable symptom as the two first.

Strain of the Suspensory Ligament.—Racers and hunters are the most liable to strain of this important ligament. It can be distinctly felt and distinguished from others not involved.

Strain of the Tendo-Subcarpal Ligament.—This is often confused with the strain next above. The situation is that immediately below and behind the knee, and when hurt is found to bulge on one or both sides.

The three important structures above named, as liable specially to strain, are grouped together; for similar treatment is required in each case, and owing to their nearness to the surface and freedom from muscular clothing or fat, enable us to use counter-irritants with the greatest advantage. Again, if we need to use the firing iron, it is in this situation we may look for the best results. (See Firing, at page 365.)

Sprain of the Fetlock.—There are several ligaments liable to be strained in this region, but the lateral ligaments are those most often hurt. The swelling is palpable and the lameness attractive. Special effort should be made by bandages and pressure by packs, to make the joint fine before putting to work, as any projection above the normal level is liable to result in brushing and further trouble. (See Brushing, at page 305.) The general principles laid down for the treatment of sprains apply to the particular structures implicated in the strained parts above enumerated; and it is principles that one would impress upon students and such as have to doctor animals: not the panacea that ignorance looks for and cupidity suggests.

Sesamoiditis. Inflamed Bones.—At the back, or rather on the sides and back of the fetlock, are two irregular-shaped bones called sesamoids from their resemblance to certain seeds. They are not articulated with the fetlock joint, but are what is called floating bones. They share in the concussion and strain of the region, and sometimes take on a chronic form of inflammation by which they enlarge, while changing in composition. (See Ostitis, at page 311.) They are a cause of lameness and often difficult of remedy. Cold lotions and bandaging give some aid, but more drastic measures are desirable, such as one or more biniodide blisters (see Blistering, at page 365) and a long turn out at grass: preferably a water meadow or low ground, and if there are leeches so much the better. This is one of the bone troubles in which firing may succeed when all else has failed.

Hip-Joint Lameness.—The ligaments concerned in the cup and ball joint are sometimes strained when jumps are miscalculated or awkward falls encountered. External violence from blows and collisions result in lameness at this part, and if the periosteum is injured, then bony growths like ringbone (see Ringbone, at page 304). In this situation it is not possible to make an exact diagnosis, and for the first week we may be in doubt whether we are dealing with fracture (partial) or severe strain, but the degree of lameness, and its abatement or aggravation, will soon enable us to determine. Whether a moderate or a severe strain, the treatment will be the same, namely, warm fomentations: massage with such anodyne and emollient remedies as camphor liniment, and later, a blister before the final treatment by rest at grass and restoration by voluntary movements, feebly begun, but increased and lengthened with recovered mobility.

Stifle-Joint Lameness.—This is sometimes called the round bone or whirl-bone, but those who use the term seldom know the anatomy of the part to which they allude and as often indicate the hip as the stifle if asked, although confident of the lameness. The patella bone and the stifle-joint is the counterpart of our knee. The horse's knee corresponds to our wrist. The patella bone has lateral ligaments which are somewhat easily strained in overgrown leggy youngsters. These ligaments may be so weak and lax that without any known strain they may be so elongated that the patella slips off and out of its place when the colt is walking and may be heard to go back with a loud click. In foals, calves, and lambs, the stifle-joint may be affected like others with joint ill. (See Infectious Scour, Navel Ill, Joint Ill, pp. 109, 110, 248, 249.) Strain of the stifle-joint in working horses, especially of those of mature years, is very liable to result in ulcerative changes of the articular cartilage, and when this occurs the animal is incurable. An inflamed and more or less chronic inflammation of the stifle-joint must not be too hastily assumed to be incurable, as it is in many cases of a gouty and rheumatic type and amenable to treatment. This form of rheumatoid arthritis in the stifles of cows is not only a cause of lameness but of rapid wasting of the limb, and later of the abdomen, and loss of milk. Hind limb lamenesses usually cause what is known as tucking up of the belly: the flanks go in and the abdomen is drawn up as if empty. A more serious lameness may exist in a front limb without any bodily loss of condition.

Treatment.—A known strain will be treated in the way already advised. A chronic stifle lameness suggestive of rheumatic gout, whether in horse or ox, is best boldly attacked by repeated iodine blisters. Not only do we hope to get absorption, but the effusion into the adjacent tissues acts as a cushion in support of the joint, while curtailing its movements and thereby giving it some rest. (See Rheumatism also, at page 54.)

Stifle-Slip, or Luxation of the Stifle-Joint.—This is distinguished by the sound of the patella going back in colts, but in older horses there may be much lameness and a difficulty in getting it back, except under the influence of chloroform, or it may have become so weak in the lateral ligaments that it rubs away the articular cartilage. (See Stifle Lameness above.) Treatment of stifle-slip in the young is generally successful if undertaken early, the subject confined to a small and level paddock, and the joint repeatedly blistered, or a pitch-plaster applied and renewed at intervals of a month or six weeks. Restriction of the movements and strengthening of the lateral ligaments may be expected, but good living is essential if a young creature is to grow out of a weakness such as this.

Shoulder-Slip.—This rare accident can be diagnosed by the evident deformity, besides the circumstances under which it happened pointing to the nature of the trouble. Comparison should always be made with the opposite limb when one is in doubt about a dislocation or a fracture. A shoulder out is a desperate business, and if professional aid is not to be had quickly, the owner should take all risks and get the animal completely under the influence of chloroform so that he becomes utterly limp. (See Anesthesia, pp. 389, 390.) Then he may secure the limb by ropes and pull on it until the necessary extension permits of the reduction of the dislocation. Once in its place, no treatment will be wanted: the inflammation caused will be the best thing for making swelling and keeping it in place. The risk consists in the chance of displacement while the animal is getting up from the ground. If once on his feet without another slip, a recovery may be expected, although it will take some time.

Luxation, or Overshot Fetlock.—Partial luxation is commonly known as knuckling over and is due to weakness in the new-born, and to strain and wear and relaxation of the ligaments and tendons in the work-horse. Very bad knuckling over or turning up of the toe, and sinking nearly to the ground on the part of new-born foals, will not justify their slaughter, as they frequently get up again and things fall into their places as they gain strength. A front fetlock knuckled over to any but the slightest extent is a very serious matter. It will be sure to get worse while at work, and finally reach a stage at which it cannot be got back or cured. Quite different is the partial luxation or knuckling over a hind fetlock. The subject of it may do useful work for years without getting much worse.

Treatment.—If it occurs suddenly and is due to strain, the general treatment recommended at page 318 is applicable. Shoeing with a thick heel: either a wedge or calkin is very helpful. Overshot fetlocks should be strongly blistered and a long rest prescribed at first, in the hope of complete restoration. With old and chronic cases, high-heeled shoes and the support of bandages and cold lotions, will prolong the usefulness of the animal.

Firing in lines and diamonds is practised for overshot joints, as the benefit of the permanent bandage is in this manner best secured. (See Firing, at page 365.)

Diseases of bones and of joints as well as of ligaments and tendons often occur together and any classification of them is more or less arbitrary. The practitioner recognizes the kind of fetlock or hock that firing or blistering is likely to benefit, without being in a position to say this and that structure is involved, and the other is not affected. What is known as a " stale " joint or swollen one that refuses to yield to ordinary measures, or that is overshot, will generally be benefited by blistering or firing, or both, and a long holiday in deep pasture or marshy land.

Joint-ill is a name given to an infectious disease of the young (which see, at page 249), to rheumatism and some other articular troubles. It is a term we might try to forget, in order to save confusion and say more nearly what we mean. Apart from the specific diseases leading to bone and joint complications, those met with in animals are the result of external violence. Working animals are liable to many accidents. Jealousy, anger, and playfulness are severally responsible for accidents and injuries to other live stock.

Open Joint.—One of the worst accidents to deal with is that of open joint. It may be punctured by an instrument, such as a stable fork, or by lying down upon a bit of glass, by barbed wire in fences: or by blows from blunt instruments, horses' feet when kicking, or sticks and stones causing such injury as presently results in breaking away of what was at first crushed skin and subjacent tissues. (See Contused Wounds, at page 295. See also Broken Knees, at page 300.) The same grievous consequences may be looked for whether in horse or ox, pig or sheep, cat or dog, but to the owner the greatest importance attaches in the case of the horse, because he must not have a stiff or ankylosed joint when the wound has healed. The pig and the cow may fulfil their mission with a stiff leg, and the pet dog may do " indifferent well " with three legs.

Symptoms.—The lameness is extreme; the pain intense; sympathetic fever runs high, and is shown by shivering, staring coat, indifference to food, injected membranes, high temperature. Joint oil is not at first distinguishable from that running from a synovial bursa, but when air gains access to the joint, as it soon does, the fluid takes on a golden yellow color, and has a peculiar odor. The discharge varies much in consistence and is mixed with flakes of lymph and pus cells. It will be watery and purulent and mixed with the saffron-colored synovia in different proportions in the same day, but the symptoms are unmistakable when a person has once seen an open joint discharging. Then the poor beast suffers greatly. The limb is raised up and down in a hopeless way: fearing to touch the ground, yet longing to obtain rest by so doing. Abscesses form and relief is obtained by breaking out in various directions, and it generally happens that at this stage the owner gets his gun and winds up the business. Throughout the enlarged joint and tissue concerned there is a soft, and subsequently hard swelling, and this is never but partly removed, however good the recovery. A thick and clumsy joint may be excused in a farm-horse or one drawing a muck wagon in the city, and we have known many such that have labored for years, after being in slings with open joint, and disappointed those who would have had them killed without a chance of recovery. The race-horse, the hunter, the park hack, or other show animal will not be likely to reward his owner for treatment; only a useful horse is likely to come out of the slings after having an open joint.

Treatment.—Avoid probing when in doubt. First, a suitable purgative should be given. (See Physicking, at page 363.)

The patient is to be secured, and if a horse, slung, before the case is too advanced. Cattle do not prosper in slings or bear abdominal pressure so well as horses, but the support obtained in this way for a few days may be the determining factor in the case, and may be recommended with caution. The smaller animals can be otherwise controlled. (See Methods of Control, pp. 413, 414.)

Our object in treating the wound is to keep out air, and as soon as possible to seal the orifice. It may be days or weeks before this is accomplished, and it is attempted in a variety of ways. To apply a blister would strike a novice as the most unlikely thing in the world to cure a wound, but the plan is often successful because the swelling around the orifice actually closes it. The actual cautery or hot iron is used by others and on the same principle of making swelling and coagulating albumen about the mouth of the wound. All sorts of varnishes and gums and plasters are employed, and of these may be favorably mentioned carbolic acid, one part, flexible collodion, fifteen parts; collodion alone; equal parts collodion and Friar's balsam; white of eggs fixed with prepared chalk; prepared chalk rubbed down with methylated spirit of wine. These may be tried in turn, so long as the discharge persists. The writer has succeeded with the last named when all the others have failed: building up a little crust or pyramid by constantly piling on new material and avoiding any rubbing off. During the time when the discharge is flowing and air still getting access, it is generally desirable to send in antiseptic lotions or mop the surface with them. One in fifteen hundred of perchloride of mercury is perhaps the best, as it is not only penetrating and effective as a germicide, but the coagulating influence of the "sublimate" is also helpful in sealing up the parts. Once the leak is stopped, Nature makes a great effort to restore the subject to usefulness, and it is difficult to understand how lesions within a joint can be so completely overcome and sound action restored, although, as we have elsewhere said, the joint very rarely if ever becomes normal in appearance. Blistering is generally recommended as refining the enlarged and thickened tissues, but the author thinks he has seen better results from a year's holiday without any medication.

Dropsical Joints.—The fluid called joint-oil or synovia is not always secreted in perfect proportions. It depends upon the general health and other considerations, and if animals are poor, if underfed while growing, or growth has been too rapid, the lubricating material loses some of its oily character, and is too aqueous. In the debility of calves, fed on cold slops twice a day in violation of every natural law; in colts with straight hocks and too long legs, and in the young of other species, where the mother fails to supply good milk, or the weaned animal finds insufficient or innutritious food, a dropsical condition of the joints of stifle, hock, knee, fetlocks. The two joints most often affected are the stifle and hock. The former becomes enlarged generally and feels as if full of fluid; the latter bulges either as bog spavin or thorough-pin (which see). When these defects occur in the young they are not necessarily permanent, as they are disposed to disappear when, with good living and constitutional strength and tone, the composition of the synovia is changed: the capsular ligaments are strengthened, and superfluous fluid absorbed. Bulging stifles and hocks due to dropsical weakness are often treated advantageously by the application of plasters, or so-called charges and blister charges. (See Administration of Medicines, etc., at page 424.)

Bog-Spavin.—A soft bulging of the inner and lower part of the hock is known as bog-spavin: a form of sprain observed in horses that were bogged or "mired down" in Britain, before roads intersected the country. It is due to a distended joint, and this is the part where least resistance is offered. Occurring in working horses, it is not of the simply dropsical character mentioned in connection with overgrown colts, but is due to a modified inflammation of the synovial or oil secreting membrane.

Thorough-Pin.—This defect should be considered in connection with bog-spavin, as they are frequently nearly related. When more synovia is present than can find room in the bulge known as bog-spavin, it may be the cause of swelling above the small bones of the hock and between the tendons and the hock joint (os calcis). This is commonly called thorough-pin, but anatomists recognize another and more serious malady by the same name, and that is an inflamed bursa or synovial sheath of the flexor pedis perforans tendon.

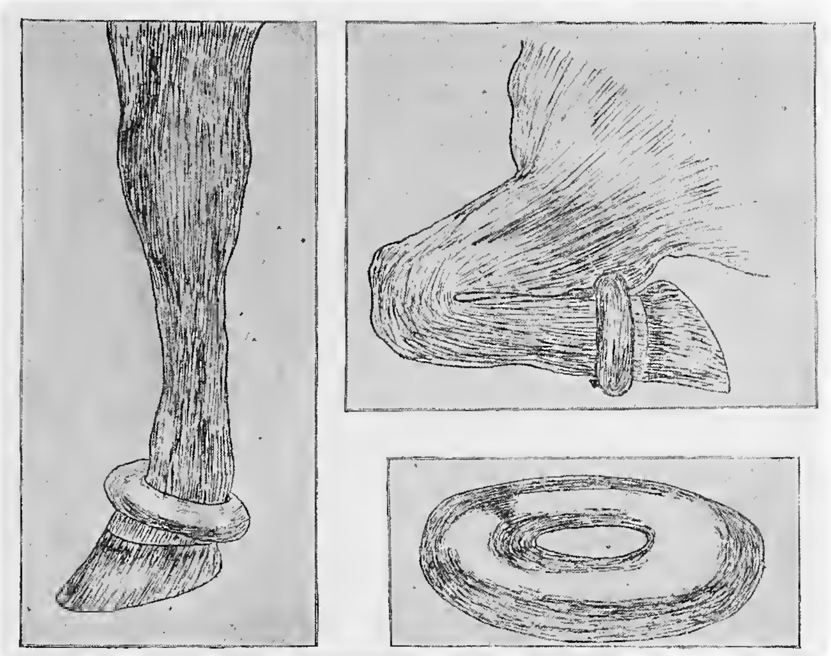


FIG. 39.—TRUSSES.

The causes of both these hock troubles and of inflamed stifle-joint are overstrain or excessive labor, too early breaking in, riding steep hills, severe bitting, and reining in too sharply.

Treatment.—This must be undertaken early in the case, or the enlargement will be permanent, even though no defect of action or lameness result. The animal should be given a purging ball of aloes. (See Physicking, at page 363.) Warm fomentations should be first applied: then cold lotions, and the pressure of suitable bandages or trusses. A rough and ready and generally successful plan of treatment is to apply a fairly strong blister all around the joint and give the animal a long rest. (See Blisters and their *modus operandi*, at page 466.)

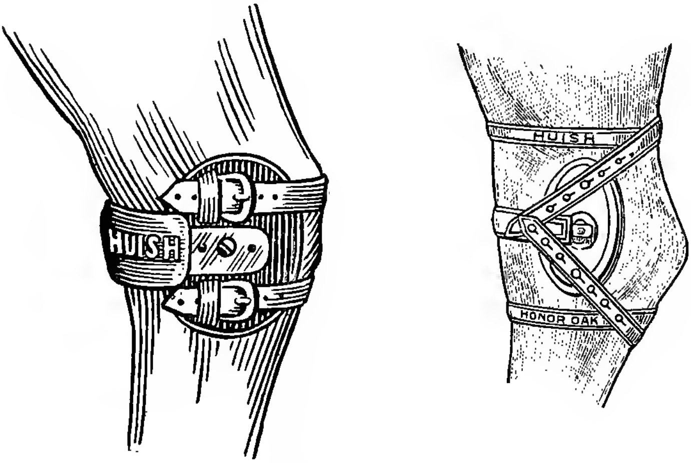


FIG. 40.—TRUSSES.

Sprung Hock.—A sprained or sprung hock is always a serious matter. It is not possible to ascertain the exact extent of the injury, as several of the interosseous ligaments may be, and probably are, involved, and they cannot be seen or felt. Much heat,

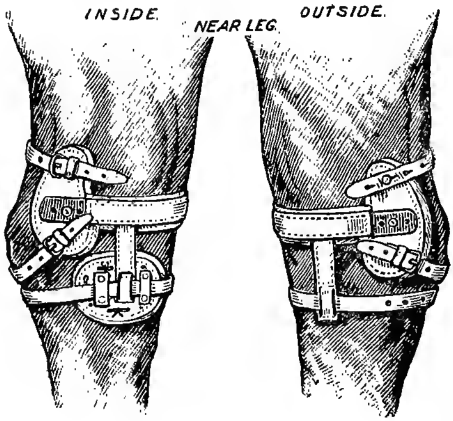


FIG. 41.—TRUSSES.

pain, and later, a considerable amount of swelling accompanies sprung hock, and the lameness and symptoms just named leave no doubt as to what is wrong. Much fever accompanies the injury.

Treatment.—The patient should be put into slings to save some of the weariness which attends the inability to impose weight on the limb, and to reduce the risk of laminitis. The animal should receive a full dose of aloes. (See Physicking, at page 363.) Fomentation, poulticing, and warm bandaging should be resorted to, to reduce the acute inflammation, and when the joint has somewhat cooled, a blister may be applied. Some horsemen apply the blister at first, and claim for such treatment the best results, as drawing out the inward trouble and giving support when most needed. Recovery is the rule, after a very long period of idleness.

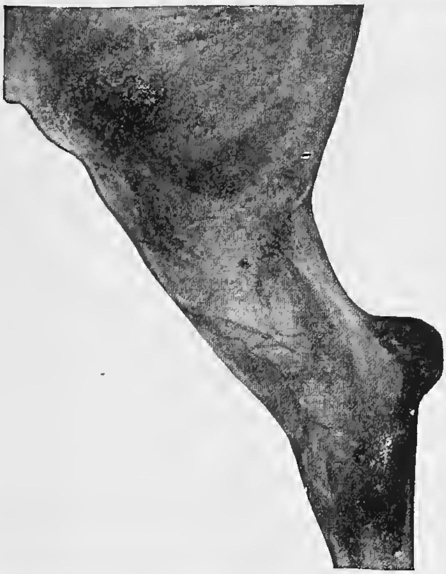
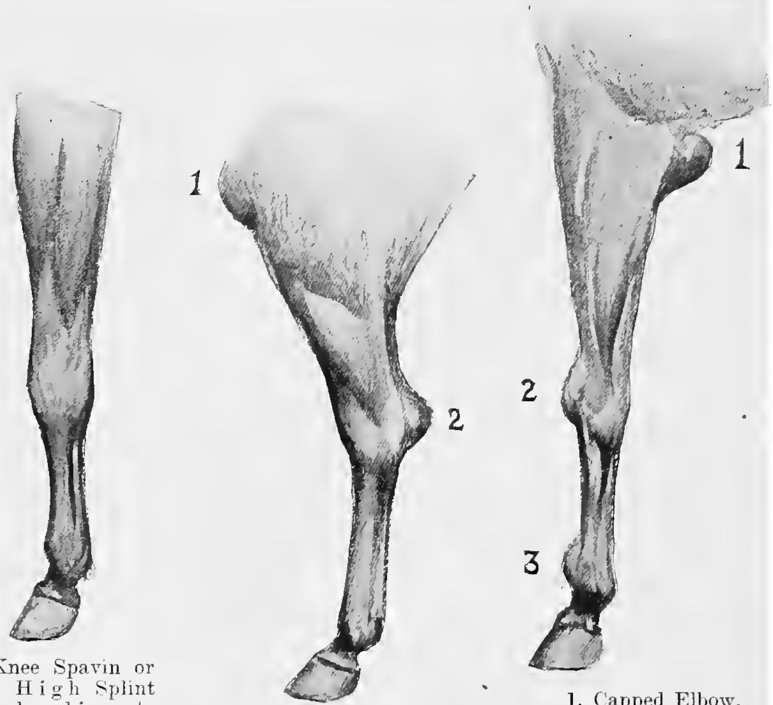


FIG. 42.—CAPPED HOCK.

Capped Hock, Capped Elbow, Shoe Boil, Capped Knee.—The enlargement of the point or cap of the hock, as most often seen, is due to an enlarged bursa or inflamed synovial sac, similar to windgalls. Capped elbow and capped knee are similar bursal distentions with abnormal fluid, owing to bruising and morbid secretion following on the injury. There are two special causes of capped hock: that just mentioned, constituting an unsightly deformity but not interfering with the soundness of the animal; and the other, occurring between the two great tendons, and sometimes leading to permanent trouble, and therefore regarded as a cause of unsoundness and depreciated value.



Knee Spavin or High Splint leading to Anchylosis of Joint.

1. Stifle Enlargement.
2. Capped Hock.

1. Capped Elbow.
2. Capped Knee.
3. Timber Leap.

Fig. 43.

Causes.—In general terms, bruising or external violence, or repeated pressure, such as is most frequently incurred by lying on bare floors; by striking against hard objects (kicking) and by falls. Some horses paw with their front feet before lying down, to such an extent that they make bare the portion of flooring upon which the elbows and hocks rest, and some few rise upon their knees, or bump them against the manger. Cows often enlarged knees from their habit of rising on the knees, and when not provided with proper bedding. The heavy breeds of dogs are also subject to these elbow, hock, and knee tumors, brought about in a similar manner and having the same pathological conditions.

Treatment.—We have seen what the common causes are and must endeavor to remove them. Many of these deformities, when of quite recent date, disappear with removal of the cause. Warm fomentations and gentle friction or massage with a soapy preparation, such as one part of soap liniment in seven or eight of water, will assist circulation in the congested vessels, and promote absorption. Tincture of arnica one part, water ten parts, is a favorite lotion, and some practitioners place their faith in tri-weekly inunctions of glycerine of iodine. Others mop the swelling at frequent intervals with an evaporating lotion. (See Medicines, at page 424.) The practice of applying blisters is entirely opposed to the writer's experience; never any good, but frequently a cause of increase in size, and consolidation of the tumor. Pressure can be applied by means of trusses. (See Figs. 39 to 41.) Knees can be bandaged. Hocks indifferently well bandaged, but trusses can be obtained for them. Elbows may be protected from further bruising. Pads or ring cushions round the lower part of the limb prevent the heel of the shoe from pressing the elbow: this being such a frequent cause of elbow tumor as to have given it the name of "shoe boil." A boil it may be, when, from repeated pressure of the shoe, suppuration is induced; then it is an abscess or boil (see Abscesses, at page 285), and the cooling or dispersal treatment above advocated will be quite useless. Capped elbows seldom cause lameness, and there is no danger in lancing them. This is necessary when pus forms, but under other conditions it is not desirable to open them. If treatment above advised proves unsuccessful, it is better to let the elbow tumor be slowly converted into a solid mass, or, as is generally found, a thick, tough wall of fibrous tissue, with a small quantity of fluid within it. Some will not object to such an unsightly tumor, so long as it does no harm, but most horse owners will prefer operation. It is a safe and simple performance provided the animal is secured. The skin is cut through for the whole length of the pear-shaped body and the connective tissue separated by the point of the scalpel until one has worked right round the hard body, when it may be lifted out. Two or three sharp knives and strong finger-nails are helpful in saving time. The slack skin should none of it be removed, but the inside of the wound should be discouraged from too rapid filling up with granulations, by being daily dressed with a five to ten per cent. solution of chloride of zinc. (See Wounds, at page 295.)

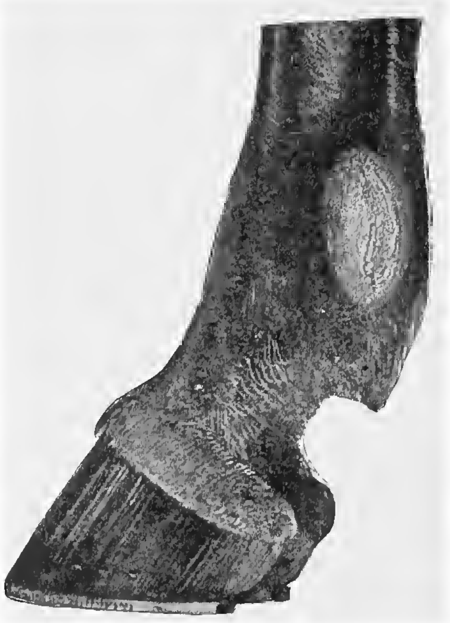


FIG. 44.—WINDGALL.

The knife had better not be used for the capped hock or knee in the case of the horse.

The enlarged knees of cows can seldom be reduced by any other means than the knife. I have never known any bad consequences to follow, but have always seen a great reduction in size, if not a complete cure. Most of the cases have already been made worse by the application of strong liniments and the skin greatly thickened before the veterinary surgeon is sought. The tumor should be slit open perpendicularly and nearly the whole length of it. If the cutting edge of the knife is kept outwards, there is no risk of injuring the joint. The cavity should be syringed out daily, with tincture of iodine, or a five per cent. chloride of zinc solution, as advised for the wound left after capped elbow operation. Unless allowed to unite too quickly there will be no reforming of fluid and not much blemish.

Windgalls.—The puffy swellings about the fetlocks are still known by this name, although long since proved to contain imperfect synovia and never holding any "wind." They were originally supposed to contain air. Windgalls are a sign of work, and should not be very prominent in young horses, or they indicate too early use, or a want of hardness. The little bursæ or oil sacs placed in situations wherever friction would be possible, become inflamed and subsequently dropsical. If they are quite recent, a blister and rest will remove them. Good bandaging leaves the parts fine for a time but the puffiness always recurs. Unless very large or disposed to be hot, windgalls are not seriously objected to; indeed the majority of horses have them as soon as they have done any real service. In a few cases a persistent inflammatory action continues and the bursa becomes consolidated like an elbow tumor. (See Capped Elbow, page 329.) The structural change is more important here, as solid bodies, where little oil bags should be, mean friction, and lameness of an intractable kind is established. When it is found that windgalls are at all disposed to give trouble the animal should be thrown out of work, physicked, blistered, and turned out upon a soft pasture. These swellings should never be punctured, as the practice leads to admission of air, acute inflammation and a modified form of the trouble described in connection with open joint, which see at page 324.

Timber Leap.—This name is generally given to the enlargement on the front of the fetlock which is caused by an inflamed bursa or windgall, very often incurred by striking timber in jumping. The situation lends itself to bandaging, and after the preliminary fomentation and physicking recommended for all these bursal inflammations (see Enlarged Knees and Bog-Spavins, Thorough-Pin, etc., at pages 326, 327), compression under a layer of cotton wool should be given a full trial before resorting to a blister. (See Blistering, at page 365.)

Curb.—Quite at the back, and lowest part of the hock, an enlargement called curb is caused by strain of one or more ligaments: chiefly the calcaneo-cuboid. It is apt to occur when colts are first broken. Many military horses are affected by them, through the custom of reining up short. Hunters naturally give way at this spot. Some warmth, not much tenderness, and a variable degree of lameness attend this injury to the hock, and more or less swelling remains when the sprained ligaments have quite recovered. It is best seen by looking from the side: getting the hock in profile. Any bulge however slight at this situation is suggestive of previous trouble, which may recur, and the animal's value is lessened.

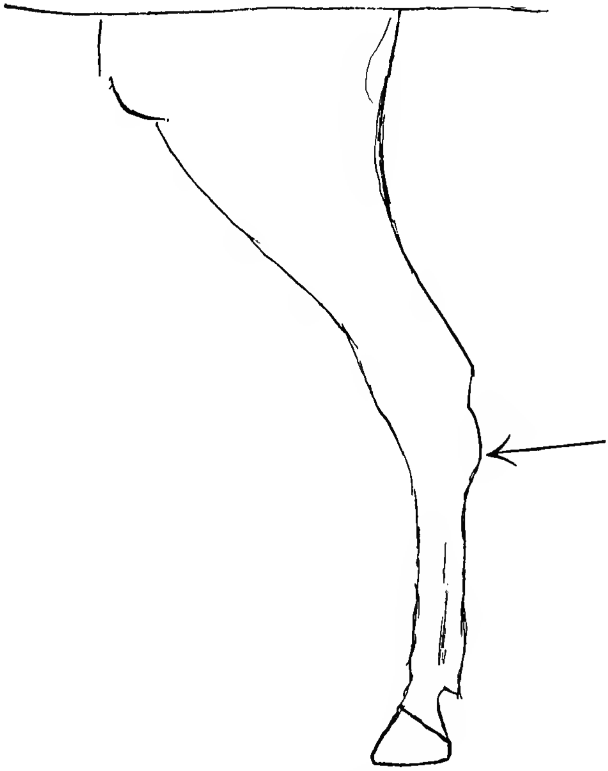


Fig. 45.—Curb.

Treatment.—A high-heeled shoe: a dose of aloes: warm fomentations for two or three days: then a biniodide blister (see Blisters, at page 466).

Three or four lines drawn by the firing iron add greatly to the prospects of the animal's remaining sound, and this is so generally known among horse dealers and veterinary doctors, that the blemish is more readily excused than the slightest suspicion of prominence at the seat of curb. It was the custom of Irish breeders until recent years to fire the hocks of hunter colts as an insurance against curb. With sufficient rest recovery may be expected.

Brushing, Cutting and Interfering.—When colts are first handled by the breaker and no longer absolute masters of their own action, they are very liable to strike the foot against the other limb. Weakness, in those already submissive to the will of man, is a frequent cause of brushing or cutting. Shoeing beyond the edge of the foot adds to the risk of striking the opposite one: the fetlock or coronet. Colts should not be shod and put into gear at once, but allowed time to get used to the shoes. It must be quite something to learn for a colt when he finds a weight on each foot. That weight is felt we have proof in the governance of high action by heavy shoes and artificial additions. The causes just mentioned may all be overcome by patience and good judgment, but a greater one remains, namely, defective conformation. Horses with turned out toes and narrow chests are specially liable to hit the opposite coronet or the inner and posterior part of the fetlock. This conformation gives rise to the worst and most dangerous form of "interfering," as it is called, namely, speedy cut. Many a horse is safe and good in the slower paces, but when pushed is liable to strike himself under the knee at the position indicated in Fig. 47 and come down as if shot.

Treatment.—Simple brushing of one foot against the coronet of the opposite one may often be remedied by taking back the shoe a very little and rasping away the crust of the hoof. It is of course undesirable to cut or rasp away much horn, but of two evils it is the lesser. In worse cases, where the coronet or the fetlock is struck after ordinary precautions, the crust may be taken back as far as the white line and what is called a feather-edged shoe applied with no nails on the inside, save one toe-nail very far forward. By making the inner half of the shoe thicker than the outer an inclination can sometimes be given that will have the desired effect. Every means should be tried of preventing interfering of one limb with the other. Good breakers put on boots before commencing with a colt, or use them as soon as he is put in harness, but they are apt to make the common mistake of not attaching enough importance to a brush or two. It should be remembered that a difference of a twentieth of an inch will mean clearing or striking, and that some amount of swelling is sure to follow: if only by a mud mark we can see that brushing has taken place. The abraded or chipped skin, which is often disregarded, offers a distinct eminence and invites further trouble. Many horses are utterly ruined by pursuing their education when a week's treatment would have put things right.

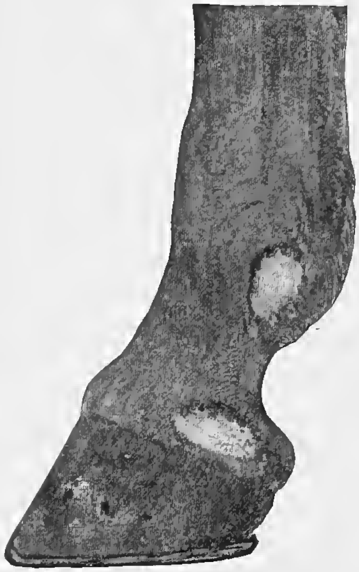


FIG. 46.—CUTTING AND BRUSHING.

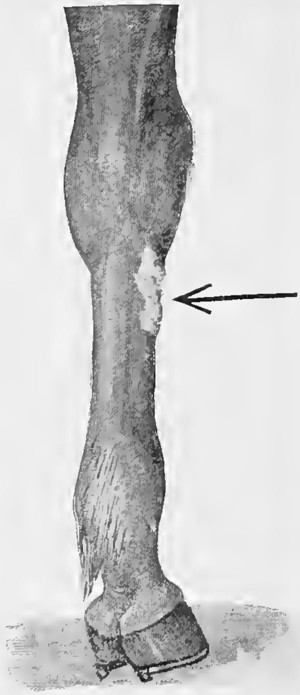


FIG. 47.—SPEEDY CUT.

A cut or brushed fetlock or other part should be fomented with warm water to which a disinfectant has been added. Then some boracic powder or other simple dry dressing powder on wool, placed over the spot, and over all a bandage, nicely pressed from the foot upwards. A good groom will do this in such a way that the colt comes out next morning with a fined joint instead of a swollen and clumsy one just in a condition to receive fresh injury. Time and a little cooling lotion is all that is usually needed, and is just what is denied in many instances, with the result that a permanent bony enlargement takes place, and the animal has to wear a boot all his life instead of having one during his school-days only. When everything has been done to prevent or cure brushing, cutting, and interfering, there remain a few cases so formed that it is impossible to insure action that will not result in damage to the subject unless he at all times wears special appliances, some of which are illustrated above.

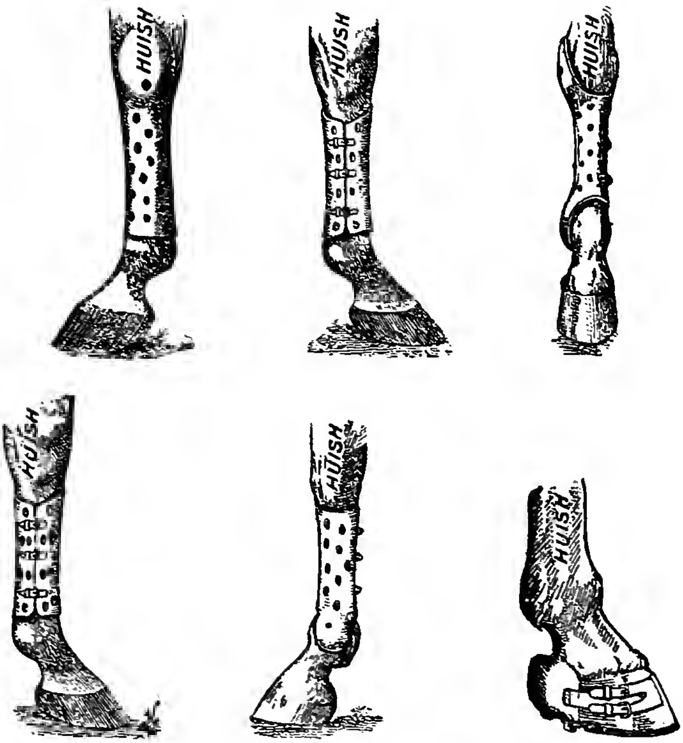


Fig. 48.—Boots. (Various)

CHAPTER XIII

DISEASES OF THE FOOT

Veterinary science may be said to have begun at the bottom, for it was from the shoeing smith or farrier that we discovered the need of some better methods of treatment than his empirical ones. Because he shod, and doubtless lamed horses, he was forced into the position of a foot doctor, and worked upwards to the consideration of other maladies besides those causing lameness. In Britain, veterinary doctors are still referred to as farriers among the rural population, although resenting the appellation, since they are no longer workers in iron, but scientific men.

In order to understand the diseases of the foot something at least of its structure should be known. A very fair and general idea can be obtained by anyone who will take the trouble to soak a newly cut-off foot (at the fetlock joint) in a bucket of water, in which a pound each of soft soap and soda has been dissolved. In the course of a fortnight or so, the hoof can be easily detached from the soft structures within. The hoof will show the lamina into which the sensitive ones fitted. The soft lamina will afford the student a view of the connection between hoof and live foot which he will never forget. If he will further take the trouble to make a perpendicular section from the top of the long pastern bone, down through the short one, and the pedal bone, he will have a general knowledge of the parts and their relation to one another which would cost him infinitely more time and trouble to acquire from museum-dried subjects or illustrations, such as are shown in this book. In writing of the diseases of the foot in the following pages we must assume some such elementary knowledge of its anatomy.

Sand-Crack.—A healthy hoof has just such a combination of hard material and gelatine as to make it tough but not brittle. Any want of balance in the constituents is liable to result in separation. Whether as a rift or split commencing from the top or the bottom, the term sand-crack is given to such breaches of continuity in the hoof. It is not generally known to horsemen that indigestion is

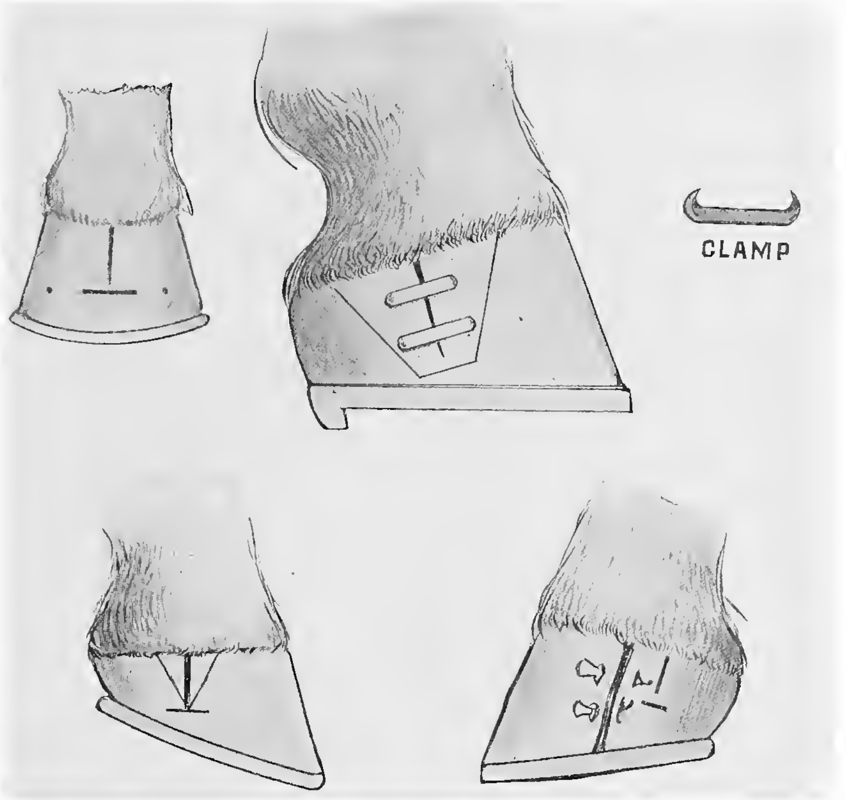


FIG. 49.—SAND-CRACK.

a frequent cause of sand-crack. There is an intimate sympathy between the mucous membranes and the laminæ of the feet, and illness or malnutrition of the body is too often reflected in the composition of horn. Sand-cracks may only penetrate through the outer layer, or to such depth as to cause blood to flow and matter to form when dust has entered the soft structures.

Treatment.—Cracks should be treated as soon as observed: not allowed to open further. If observed when they first appear, it may only be necessary to take the bearing off the shoe by hollowing out a crescent-shaped portion of crust immediately below the rift, and stimulating the coronary band with any warm liniment, as hartshorn and oil or white oils. A line drawn below the crack with a red-hot iron is believed to divert concussion and reduce the risk of further mischief. We prefer one transversely to the crack and on each side a divergent line leading to the coronet, making a letter "V" with its apex downwards, as this directs the jar or concussion of the foot towards the sound portions of the coronary band while relieving those distressed. Bindings of tarred cord, straps and other appliances are used to keep the crack together. A horse nail horizontally driven through the crust and clenched is a simple and serviceable old contrivance, but better things are supplied by veterinary instrument-makers. A mild blister, repeated in a month, has the effect of growing down a new and stronger layer of horn.

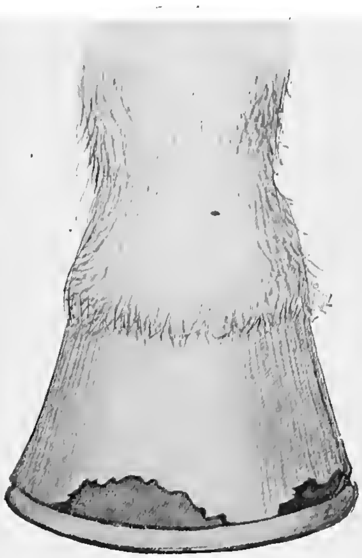
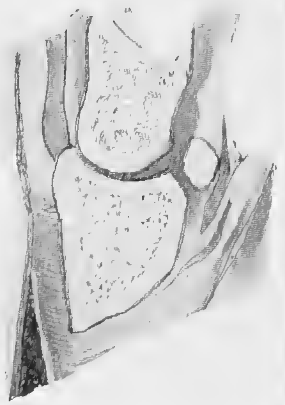


FIG. 50.—SEEDY TOE.



SECTION SHOWING SEPARATION.

Seedy Toe.—Another defect of horn is that known as seedy toe. A soft decay takes place between the outer hard layer or periople, and the innermost horn secreted by the lamina. It affords no hold for the shoe nails unless sufficient hard periople is left above. Usually beginning at the toe, it may work round a long way and involve so much of the foot that the animal cannot be worked. There is a parasite associated with this horn degradation, but it is not certain whether it is the cause, or merely finds a suitable habitat in the decomposed horn material. This defect is one of which advantage is often taken by unscrupulous sellers, who fill the cavity with black wax or rubber and other hard substances.

Treatment.—The shoe is removed and the whole of the seedy or bad portion carefully excavated. Spirit of tar is then poured in and some tow dipped in melted Stockholm tar inserted with moderate pressure. If the horse can be shod with leather to retain the dressing, have it often enough removed, and secure the shoe without further damage to the crust, there is no doubt that a subject of seedy toe does better at work than idle. It is well to stimulate growth from above by occasional friction with white oils around the coronet.

Corns.—The seat of corn is the angle between the bar and the crust. Pressure here causes bruising. A corn when first seen is a blood-stained portion of horn representing a bruise above. Shoes that have remained on too long, are a principal cause of corns, but bad shoeing and certain weak conformations of foot, as the low-heeled and flat-footed, favor the production of corns. If neglected, they fester or suppurate; the subject is very lame, and if the cause is not discovered and efficient drainage afforded, the matter takes the least line of resistance and comes out between hair and hoof, and may end in quittor if any diseased structure has not passed out with the matter. (See Quittor, at page 343.)

Symptoms.—Lameness, heat in the heel and resting of the foot in the stable. The cause of any lameness should be sought at once and this remark applies with special force where corns are concerned. Having removed the shoe, the seat of corn should be pressed with the blacksmith's pincers. Flinching or evidence of pain will lead us to cut away the horn covering the tender spot. The writer has learned to insist on much more paring than the average smith is willing to make, and not to be satisfied without seeing a drop or two of blood, if finding nothing worse. Many corns are so indifferently bottomed that they break out later at the coronet. Vent is the thing needed. Once the pressure is removed and the injured surface given freedom to cast off matter, the process of repair will follow. An antiseptic such as carbolic acid should be used in every case in which the foot is cut down upon, and if matter is found—the green, sappy matter, so common to decomposed horn, or genuine pus from the sensitive lamina—a poultice should be applied. A small quantity of linseed and bran in the space, and retained by a piece of hoop iron, or a couple of flat pieces of wood, may be more desirable than a large cataplasm enveloping the whole foot, as we are anxious to draw the matter out at the bottom and save the coronet from a breach, although the pus is taking that direction. New horn is rapidly formed over the denuded portion, and in a few days the animal can work if protected by a bar shoe. Shoeing with what is called a three-quarter shoe gives a corn the best chance of growing out eventually.

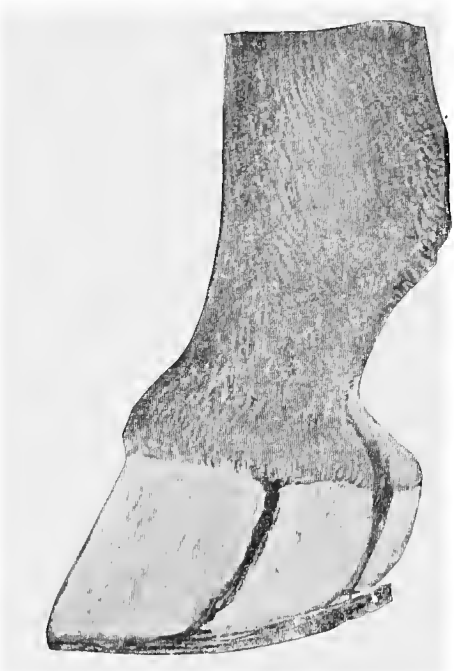


Fig. 51.—False Quarter.

False Quarter.—This name is given to a permanent defect in the hoof from some injury to its secreting surfaces, such as quittor, **festered corn,** frost-bite, burns, treads, and other injuries of so violent a character as to cause death of tissue. A ditch or fossa remains, as seen in the illustration. There is no remedy for it, but buyers must see that such cavities have not been filled up with gutta percha or cod wax.

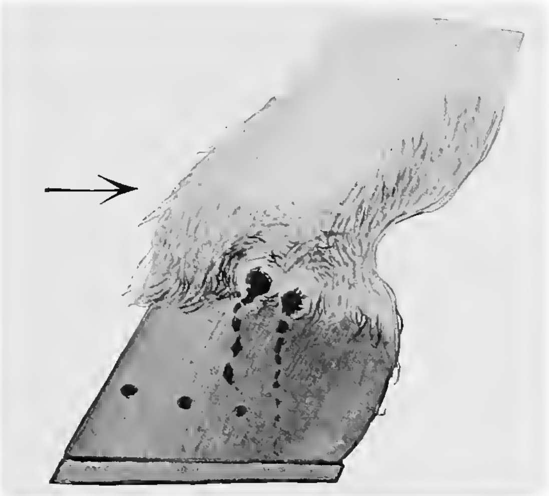
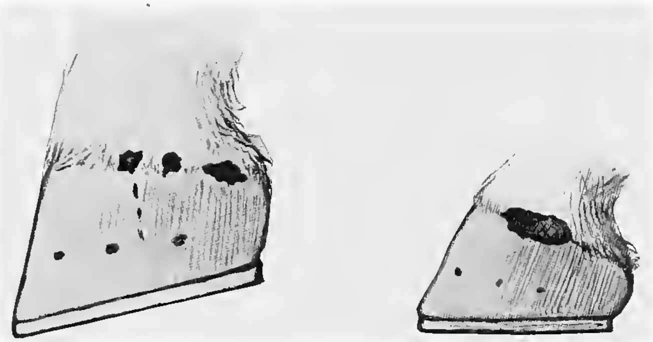


FIG. 52.—QUITTOR AND RINGBONE.

Quittor.—Quittor is an old name given to a sinus abscess in the foot which is of the same nature as fistulous withers and poll evil (which see, at pages 289, 299). A blow on the side of the foot, a festered corn or neglected prick; anything that may first excite inflammation and leave behind a minute portion of dead tissue, will set up a quittor, just as we have seen a bit of ligament or tendon damaged beyond repair cause a fistula or pipe to form at the withers or the poll. It is a drain by which to carry away—all too slowly for horse owners—the dead or dying material within. The most frequent cause of quittor is the death of some minute portion of the lateral cartilage: the same structure which gives us trouble under the name of side bone. The wound cannot heal while any dead matter remains within. It will appear to do so and seem almost scabbed over and the patient will be much less lame, but a few days later another burst up will occur just in front of the last, and this will go on so long as the offending body is not removed. The reader is asked to look up poll evil and fistulous withers before treating quittor, and vice versa, as he will then grasp the essential principles common to all successful treatment of fistula whether in the head or the heels or elsewhere, and will not be misled by plausible recommendations of cure-alls. The painful method of plugging is reluctantly recommended here because it is the most successful. The writer has seen quittors operated upon by the hour at the Royal Veterinary College, London, and all sorts of probe-pointed bistouries employed, and the feet poulticed until they were as soft as cheese, and then the knacker's cart brought in to carry away the results; while so-called quacks have been habitually successful with little screws of corrosive sublimate: arsenic, sulphate of copper or zinc, which they have pushed down through a quill or other crude appliance with the result of much pain to the poor beast, a slough which comes out in a few days of poulticing—they call it a " core " —and a gaping wound which soon heals up from the bottom, and is finished off by a mild blister which contracts the loose soft tissues to a durable condition. If the sinuses could be bottomed by a cutting instrument, the more scientific and humane practice would answer, but they spread like the roots of a tree, and the liquefied caustic follows them where the surgeon's hand cannot direct a knife.



FIGS. 53 AND 54.—QUITTOR AND TREAD.

Foul of the Foot in Cattle.—This has been compared with quittor, but several diseased conditions of the feet of cattle have been confused together under the term of foul or kibe. When lame on the feet we should look for any swelling between the digits, more especially in front. Here we may find the interdigital tissues so injured as to be in process of sloughing. Overgrowth of one side of the foot puts a strain on the coronet of the other side, causes inflammation, cracking open, and the entrance of dirt: the suppuration with more or less death of tissue and a discharge resembling that from quittor. Foul, loo, or kibe, call it as you will, is always a tedious and troublesome disease. Persistent poulticing is needed to draw out matter and to favor the separation of a slough or core when any of the tissues are so damaged as to necessitate detachment before healing can take place. We may prescribe poultices for the dairy cow, always under control, and used to coercion, but it is not easy to get such directions carried out. The next best thing is to bind on tow or old linen with a liberal smear of Venice turpentine, or else yellow basilicon ointment. These substances act in the same way, only not so well as poultices, with the advantage of moisture. When a slough or core has been cast, a weak zinc chloride lotion is suitable—two per cent., for instance. Kibes occurring in hot weather (as they frequently do) need particular attention to prevent fly-blow. If they can't be put in the shade the sufferers should have their feet enveloped in a bag or a poultice boot.

Thrush.—An offensive discharge from the frog is known as thrush and is caused by decomposition of the horn. Although commonly confined to the cleft or division of the frog, it often extends to the whole of its substance, decayed portions falling away and ragged holes and fissures are left. The smell resembles that of rotten eggs. The principal causes of thrush are absence of natural pressure due to the practice of shoeing: cutting away of the frog: standing in urine and manure: a constitutional predisposition, etc.

Treatment.—Any of the caustic astringent remedies will dry off a thrush. The sulphates of iron, copper, zinc, chloride of zinc, calomel, and mixtures of these substances in various proportions. The drying up by such remedies is followed by shrinking: the heels fall in: the frog never again receives the healthy pressure intended by nature, and with this contraction of the foot, navicular disease and other foot troubles are invited. This being so, we should not be in a hurry to use the remedy that most quickly dries up thrush, but seek to remove the cause. Let the frog grow all it will. Trim away nothing but rags that would fall away to-morrow. Let the shoes be removed and nailed on again when thin and worn, while affording a measure of road pressure to the frog. By shoeing with Charlier shoes, or sunk tips, or by adding pads: by any means suited to individuals and their particular kind of employment, endeavor to restore the pressure which is essential to the healthy action of the sensitive frog from which the horny frog grows. As to external remedies, a dressing or two of the above astringents may be necessary as a preliminary proceeding, but nothing stronger than Stockholm tar, four parts, and table-salt, one part, is needed when once put under proper management, and the frog made to receive pressure or bear weight. Tar is a great preservative of hoof, and withal a disinfectant. For thrush dressings, see Medicines, at page 464.

Canker.—This horrible disease of the hoof is very generally stated to be a sequel to neglected thrush, but is often seen without thrush, and the very worst cases of thrush are to be found without canker. Canker is caused by a fungus. It may begin like a spot of leprosy, only it is a pale yellow instead of white, and it is just about as sure to spread. Canker is never cured unless every atom of the diseased structure is removed. The stench of canker is quite sickening to most folks, but blacksmiths and horse doctors learn to keep their gorge down while dressing feet so affected.

Treatment.—Cut and scrape and burn away every atom of diseased frog and sole. Apply nitric acid or spirit of salts or a mixture of the sulphates of iron, zinc and copper in equal parts. If one corrosive fails another should be used. The principle to be observed is that of destroying all morbid growth and getting down to the horn secreting papillæ and acting upon them in such a manner as to induce them to secrete new and better material to take the place of the old. Stripping by knife and iron and caustic can of course be effectually performed, although a painful operation, but some kind of mechanical pressure is then needed. If the shoe is put on, the sole surface can be packed tight with tar and tow or other compressible material, and wedges placed under the shoe: but more than this is needed. Work, or the pressure which active exercise will add, is much to be desired, and the best results are obtained when such horses are employed upon the land. Canker can be cured in this way: but "is it cruel?" most people will ask. The various societies for the protection of animals say it is, and get up prosecutions against owners, and doctors for causing and abetting. If we could put the question squarely to the patient whether he would be killed, or suffer pain in being cured, which would he say?

Pricked Foot.—The feet of all animals are liable to pricks from nails, broken bottles, thorns, sharp stones, and stakes or cut down hedges and brushwood, and even from softer substances in the case of pigs and dogs, between whose digits such things as bearded barley and grass seeds penetrate, and by the action of the limbs are moved up the leg and come out at unexpected places. As many as five grass seeds have been taken out of a dog's leg by the writer at intervals of many weeks. Of the latter kind of pricks or wounds of the feet we too seldom have evidence at the time, but the pricks of horses and cattle usually result in immediate lameness and attract our attention in time to give valuable assistance. In importance the horse of course stands first, and further, he runs more risk than other species, although his foot presents a larger surface of horn of a hard nature: we refer of course to the risks entertained in shoeing; these applying only in less degree to oxen that are shod for field service. Readers not familiar with the work of the shoeing forge may be surprised to learn that a good many wrongly driven nails and actual pricks occur without causing trouble, because the smith *feels* when a nail has taken the wrong direction, and the horse tells him, too, by his snatching of the foot, when the onlooker may not see it. He draws the nail instantly and pours in a drop of nitric or hydrochloric acid (spirit of salt), and this powerful antiseptic saves the situation, and the punctured wound does not fester. When the prick is not known at the time, or the nail is only pressing upon but not actually inserted into the quick, the horse may go away from the forge apparently uninjured, and these are the cases that most often lead to serious trouble, because days, perhaps a week or more, may pass before the animal becomes lame, and after such a lapse of time the horse owner is thinking of every other cause than the right one. If an animal treads on a sharp rock and falls lame at the time, or picks up a nail on the road, it will be noticed and attended to. Because the foot is so often penetrated, the practical veterinary surgeon will always insist on a minute examination of the hoof of a lame horse, unless some most obvious cause is there: even then we have known a horse to be lame in the hock and have a pricked foot at the same time, and it has so often happened that pricks have been overlooked that the doctor will have the shoe removed in all cases in order to make quite sure. Lameness due to foot troubles (see Navicular Disease, at page 353) is very deceptive to amateurs, because the animal that comes out only a bit "shovy" will warm up and go sound after a little exercise, and if the lameness is comparatively acute, he will improve on the journey. This well-known fact is one of the helps to diagnosis when fully understood, as the opposite is the case in splint and ringbone and other ossific deposits.

A pricked, stabbed or cut foot will be advanced in front of the other when in the stable, if a front one; and if a hind one, the animal will rest on the toe with the limb flexed.

Treatment.—It is of the greatest importance to search the injured member and get to the bottom of the wound. It may be only from a drawn nail, or some foreign substance may be buried in the quick. The mistake all beginners make is to fear cutting away enough horn. Many farriers share this objection to drawing blood, but it must be overcome. If the animal shrinks or flinches from the pressure of the pinchers at a nail hole or part of the sole or frog, that part should be freely cut away until the trouble is bottomed, and vent given to the pent-up matter. A horse will be so lame as to suggest a broken bone when there is but a single drop of matter confined: this matter having the appearance of green sap when discovered early, but leading on to the formation of pus, which, if not released from below, will find its way out between hair and hoof, taking the least line of resistance, and perhaps resulting in a quittor (which see, at page 343). When the injury is unmasked, some thinning down of the horn should follow, and a fair amount of drainage allowed before applying a poultice containing an antiseptic (see Poulticing, at page 285). Hoop iron under the shoe or pieces of wood will serve to retain a small poultice, and it is often advisable to apply it only in this way and not soften the coronet by inserting the whole foot in a poultice. At the same time it is advisable to give an aloetic ball as a derivative calculated to withdraw blood and diminish inflammation. When matter ceases to come away and the animal stands fairly on the injured limb again, cold swabs will help to complete the cure, but he should on no account be put to work until the hoof feels as cool as the next.

Fever in the Feet, Laminitis.—Inflammation of the foot is a serious trouble and may be acute or chronic. There is no mistaking its effects in the old subject with many rings round the hoof, with big heels and a gait that has so changed from the normal that he puts the heel down first. The causes are chiefly preventable ones. Over-feeding and idleness, too fast or long journeys made when out of condition, acute indigestion, sudden changes in temperature, and metastatic transference from other organs. Inflammation of the lungs or congestion of those organs will sometimes suddenly transfer itself to the sensitive laminæ of the feet. A horse or cow that has broken into the corn store and gorged itself will have stomach trouble first, and then laminitis. A mare or cow or sheep will have inflammation of the womb to-day and fever in the feet to-morrow.

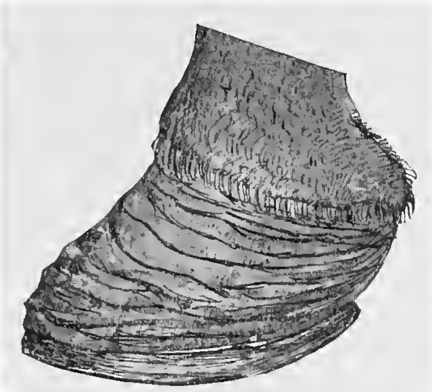


Fig. 55.—Laminitis—a Pumiced Foot with French Rocker Shoe.

The symptoms of acute fever in the feet are often mistaken for some spinal trouble, because the sufferer is found with more or less arched back owing to drawing the hind feet under him, to relieve the weight and tension in the front ones. Whether the front feet only, or all four feet are involved, the aim of the sufferer is to impose his weight on the heels where he will feel it least, and having assumed the least painful attitude he will appear to be stuck to the ground and as unwilling to move as if he were made all in one piece and without any joints. It has also been mistaken for acute rheumatism. The enquirer in doubt should insist on the animal moving up and down the stall, when he will recognize the nature of the malady. Chronic laminitis may follow an acute attack, or slowly develop, when the sufferer loses his action and changes his gait and frequently rests upon the toe: the hairs round the coronet grow abnormally, and rings appear round the hoof, and there is a fumbling, pushing sort of movement of the front limbs, in place of the fearless stride and fair placement of the foot upon the ground.

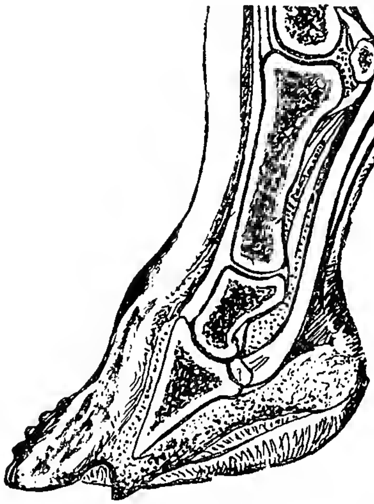


FIG. 56.—LAMINITIS—SHOWING DESCENT OF THE COFFIN BONE.

Treatment.—Remove the shoes while it is possible, for some horses cannot be induced to hold up one foot and impose more weight and consequently more pain upon the others when the disease has made progress. The clinches should be rasped off, or lifted before asking the sufferer to hold up for the necessary operation of removal of the shoe. Voluminous bran and linseed poultices, made warm but not hot, should then be applied, and every inducement in the way of good bedding be offered to encourage the animal to lie down. This is what most subjects of laminitis refuse to do, as they know by instinct the great pain they will suffer in getting up again: and so they keep the inflamed structures continuously on the stretch by persistently standing. We have known cases where casting with hobbles was necessary in order to remove the shoes, and have then found the animal much benefited by remaining recumbent for some hours. The hypodermic injection of a ten per cent. solution of cocaine into the heel, ten minutes before making the horse get up, will enable him to do so without pain. An aloetic ball should be given at the commencement of the attack, and bran and linseed mashes or cut green food offered: it being most desirable to lower blood pressure. Old-fashioned practitioners bled from the toe vein and from the jugular also in fat and pampered animals, and much good may be expected from the practice, provided septic matter is guarded against by plugging the foot with tow and carbolized oil or other disinfectant (see Antiseptics and Disinfectants, at page 410). Horses and cattle sometimes cast their hoofs in acute cases. If a horse is slung long enough, the hoofs will grow again, but it is seldom worth while doing this, unless for a mare it is desired to breed from. A horse of average value will eat his value while under treatment. Cattle can put in so much time on the ground that it pays to keep them until the new hoof grows.

When acute symptoms of laminitis have subsided, a rocking shoe is advised, thicker in the middle than at the ends, and seated out in order to afford the utmost cover, but not to have any bearing on the sole. A mild blister round the coronet and a turn out at grass assist to restore the injured tissues, but there will be more or less separation between the hoof and the sensitive lamina: a cheese-like and degraded horn occupying the space between and permitting in the worst cases of further deformity by the descent of the foot bones, as shown in the illustration (Fig. 56). Foundered horses may, however, do much slow work if properly looked after and afforded such protection as the wide-webbed shoe and leathers will procure. Hot footed or chronic subjects of laminitis are helped by an occasional half dose of aloes, and a diuretic, and by immersion of the feet in a tub of tepid water in which a teaspoonful of soda has been dissolved. Wet swabs round the coronets at night also tend to relieve internal pressure.

Sidebone.—This is the bane of the heavy breeds, and especially of the massive English Shires. At the sides of the pedal or coffin bone are two wings or prolongations consisting of cartilage, and in a normal subject this cartilage will bend under the pressure of the thumb from outside. By sidebone is meant a conversion more or less complete of this cartilage into bone. It is a frequent cause of lameness, and is regarded as unsoundness when only a part of the substance is ossified, but all degrees of bony deposit are found, from the nodule detected with difficulty by the expert, to a mass of bony material uniting the bones of the foot in an incurable ankylosis. (See Ringbone and Splint, pages 304 and 306.) Sidebone is well known to be hereditary, and sires with this defect should be rejected. The lighter breeds are by no means exempt from this change of structure in the lateral cartilage, and with horses intended for fast work it is even more serious than in heavy draught animals, which may be capable of walking, but lame in faster paces. The

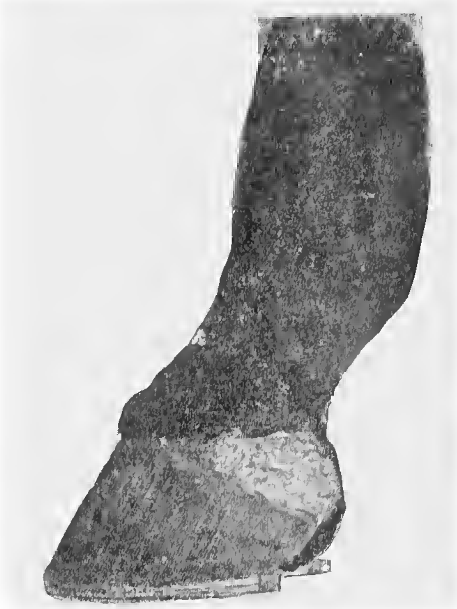


FIG. 57.—SIDEBONE (EXPOSED).

causes are concussion, bad shoeing, and injuries, besides the inherent tendency already spoken of as heredity.

Treatment.—When first detected, either by slight lameness or heat in the region, the horse should be thrown out of work, given a dose of physic, cold lotions applied to the pastern, the shoes removed and others specially fitted to divert concussion. With a turn out and rest, the structural change will probably be arrested. If, however, there is reason to suppose the mischief is growing, it will be better to employ a sharp blister at once, and repeat in six weeks. When blistering fails, firing is often resorted to, either in lines coming down through the coronet, or by puncture. (See Firing, at page 365.) If firing and blistering and a long rest prove unsuccessful, we have a final remedy in unnerving or neurectomy (which see, at page 378).

Navicular Lameness, Grogginess, Shoulder-Tied. — Several diseased conditions of the foot, but with symptoms in common, are recognized by the names given above. Groggy horses are less numerous than formerly because it is more generally known that the trouble is hereditary. Young mares failing in their working life used to be bred from during a long rest which was believed to be a remedy, because the unfortunate owners attributed the short gait to the shoulder, and called it shoulder-tied or shoulder-foundered. It is an easy mistake to make in view of the symptoms shown. Concussion seems to be the most common cause, and we therefore find it most often in hunters and high-stepping horses and such as bring down their front feet with too much force. The high-stepper is not necessarily a "puncher," and some animals with rather heavy forehands and but low action suffer more concussion than those with better action. The more general laying of wood-blocks in place of stone-sets in cities has also reduced the number of navicular cases, and the use of leathers, rubbers, and other contrivances has also had the effect of reducing the number of cases of grogginess in the high-class stable.

Symptoms.—As a rule, navicular disease comes on slowly. The hunter or fast trotter of yesterday pulls out stiff, and seems to go a little short, and this trouble passes off with exercise, but there is an increasing disposition to this short step and to pointing the foot in the stable. The latter symptom is often seen long before the stilted gait is observed, and is attributed to habit only. As the disease makes progress the step is shortened and the time required to work it off increases, as does the uneasiness shown by placing the forefoot forward, and the opposite hind-leg under the belly to take off weight. When both front feet are affected there is alternate shifting and placing of the opposite diagonals more in advance than usual. In other cases the lameness comes on quickly and is traced to a particularly hard day's work or long journey on hard roads, but the symptoms are the same. Bad shoeing is often assigned as the cause, and it doubtless contributes, because the vicious custom of cutting away the frog and sole is still all too common, and this robs the inner foot of functional vigor and tends to make the heels fall in. Proof of this can, I think, be found in the frequently curative effect of Charlier shoes, or going without shoes at all, when the disease is early recognized. The frog and sole soon grow again and the sensitive structures are better accommodated. No part of the frog or sole or bars should be cut away. Only ragged or exfoliating pieces of horn lifted out when in the way.

Treatment.—The hope of cure depends upon early recognition and removal of shoes, physic, a blister round the coronet, and a turn out on a moist pasture. Some few cases completely recover, but quite the majority only appear to do so. When put to work they soon again fail. Chronic cases can be kept going by swabbing the feet at night with cold water and by tubbing in warm water before starting on a journey, but the horse is always in pain when at rest although he may warm up and go sound while at work. The usual history of navicular subjects may be summed up as: frequent blisters and rest at grass, many new masters, and finally unnerving. A long experience and hundreds of operations has led the writer to advise the reverse proceedings, and to have neurectomy performed as soon as the disease is definitely diagnosed. There is no cure for it, and to deprive the foot of sensation after much degeneration of structure is to invite disruption of diseased structures and bring about the end. If the operation of unnerving is performed in the early stage, many subjects will go sound for years; quite a number I have operated upon have lasted ten years and upwards, while others have not done many months' service. (See Unnerving, at page 378.)

If the foot of a dead horse that has suffered from navicular disease is dissected, it will be found that the tendons in the neighborhood of or attached to the little shuttle bone called navicular, are degenerate, and fibers of them very likely broken away, while others are softened and enlarged. The bone itself is not in all cases visibly affected, but in many the articular surface will be seen to be eroded or ulcerated, and on section, the inner part will be found congested and perhaps having ragged holes in it. In some few cases the wings of the pedal or coffin bone are chiefly affected, when it is not true navicular disease, but involving the navicular joint more or less, and showing during life many but not all of the symptoms special to the ulcerated bone trouble. The pointing is perhaps less pronounced, and the disposition to flex the fetlock and rest the toe is observed.

Inflammation of the Coronet, or Villitis.—The coronary band, from which the outer hard layer of horn is secreted, is liable to become inflamed and produce a certain "shoviness" not unlike navicular disease, but for the slightly increased disposition to go on the heel instead of the toe. The navicular subject goes best uphill, but the sufferer from coronitis or from fever in the feet travels better down hill, where he can impose most weight on the heels. Very soon a bristling appearance of the hairs around the top of the hoof makes known the presence of inflammation, if lameness has not already led the horseman to seek it. If neglected, this inflammation of the horn secreting band fails in its office and the hoof becomes brittle and is covered with rings or ridges.

Treatment.—An aloetic ball. Cold poultices for a few days, and then a mild blister and a turn out in a low-lying meadow.

Carbuncle.—The coronary band may be the subject of carbuncle as the result of frost bite or other injury. A slough is cast in the same way as in tread.

Tread.—Horses working in pairs, and having to turn in narrow roadways and under other circumstances, sometimes tread upon the coronets of their yoke fellows. From such severe injuries and from frost bites, death of the part follows. Very great pain is experienced at first, and some time is occupied in sloughing or casting off the dying tissue. (See Contused Wounds, at page 295.)

Treatment.—The injured member should be put into a large, warm, but not too hot poultice, and so treated for a few days until the dead portion comes away: after which the wound may be treated as a granulating one and dried off by painting the surface with Friar's balsam or tincture of myrrh or some weak caustic lotion if it seems disposed to grow proud flesh. (See Wounds, pages 294-296.)

Horn Tumors.—Unnatural growth of horn inside the hoof of the horse is an occasional cause of lameness, and the only chance of cure is by a difficult operation. Similar growths occur between the digits of cattle and sheep and give rise to much inconvenience, but they can generally be carefully dissected out. It is necessary in doing so to avoid as far as possible injuring the coronary secreting band, or a false quarter will follow. (See False Quarter, at page 343.)

Brittle Feet.—Feet so brittle that they break away and fail to hold the clenches of the nails are a serious drawback to a horse, and a cause of trouble to other species. Like seedy toe and sand crack (see at pages 338-341), there is a want of proportion between the gelatinous and denser constituents. Chronic laminitis or coronitis induce this state of the horn, as the function of the horn papillæ is imperfect. The intimate relation between the feet and digestive system has been elsewhere mentioned. Brittle feet are often due to indigestion.

Treatment.—Seeing that the causes vary, we cannot look for a common remedy, but must first ascertain to which of them a case is due. (See Diseases of the Digestive System, Indigestion, etc., pages 92, 93.) In the majority of cases brittle feet will benefit by frequent stimulation of the coronary secreting band by such remedies as one part of biniodide of mercury to twelve parts of lard or vaseline, or more frequently applied liniments, such as white oils or ammonia or soap liniments. When chronic laminitis is the cause, occasional doses of 100 grains of aloes in a ball, with half an ounce each of hard soap, and of resin, may be prescribed with advantage. Foot dressings of tar and grease help to conserve some feet, but water is all that is needed for the healthy.

Foot Rot in Sheep.—Foot rot in sheep appears to be infectious in some seasons and on some soils, and at other times and places the introduction of a subject of it into a sound flock is not followed by further cases. This probably accounts for the variety of opinion held among observers of the disease. The safer plan will be to deem it always infectious and segregate lame animals promptly.

Treatment.—It is important to turn the sheep and dress the feet immediately on discovery of a lame animal, for it is always curable when taken in time, while chronic subjects of it may have suffered irreparable structural changes. It is a troublesome business and but few men will give the detailed attention required. If the diseased portions are scraped away and the parts lightly dressed with a feather dipped in a saturated solution of copper sulphate, of arsenite of soda, sulphate of zinc or iron, or the chloride of antimony, the case will almost surely be cured, but pouring a lot of expensive lotion onto and off the foot again without reaching the diseased tissue is just so much waste of money and self-deception. If it is worth doing at all it is worth doing well. In the case of large flocks and but few hands to attend them, other measures of a general or wholesale character must be resorted to. They are more or less effectual according as they are carried out with care or otherwise. The difficulty is not in finding a good remedy or half a dozen trustworthy recipes, but in getting them applied. It stands to reason that the cleft of the foot (interdigital space) and the upper part of the hoof will not be cured by a remedy that is fenced off by a hard clod of mud fixed between the claws. It may be, then, that the first need is to drive the flock into shallow water and keep them there until the feet have been cleared of earth. After that, a remedy may be applied in the form of a powder or a bath through which the sheep are made to pass slowly, one at a time. A gateway or a pass constructed of hurdles may be deeply laid with recently slaked lime, and the subjects of foot rot allowed to go through one at a time and so dress their own feet; or a mixture of equal parts by weight of the sulphates of iron, zinc, and copper may be employed with advantage. Solutions of the foregoing or of one part of arsenious acid and two parts washing soda, boiled in twenty parts of water, make a good foot bath, but this must be constructed so as to reach only to the upper part of the hoof and not damage the skin. A long, narrow trough of wood answers best, and when putting the sheep through it, the top should be covered in to prevent leaping. We have seen these remedies applied with a large measure of success in great flocks, where individual handling is out of the question, but the man with a few sheep will do best to turn and trim every individual. Foot rot lotions will be found at pages 357 and 465, but more depends on the man than the remedy selected.

Foot and Mouth Disease.—This is not a malady the owner is allowed to treat in most States, as the need for keeping it under control has led most legislatures to order the stamping-out system first adopted with so much success in Great Britain. If animals are to be treated they need only to be supplied with food they can easily take with sore mouths, and be given a few doses of salts and magnesia, or other simple saline laxatives, while the broken membranes of the mouth and skin around the feet are dressed with a strong solution of alum. The writer has treated many cases in the long, long ago and found excellent recoveries made from the employment of nothing but alum to the lesions.

CHAPTER XIV

CONDITIONING

THE word condition is used in two separate senses in respect of the domesticated animals. The man who would run a racer or get a hunter " fit " means quite a different thing from the individual with a show beast, either horse, ox, or sheep, to be exhibited in the best possible condition. Condition in the 'chaser means a state of the highest capacity for speed and endurance, by reason of training and preparation; a systematic course of treatment in which feeding, watering, grooming, and exercise have resulted in developing the greatest amount of strength both of the voluntary muscles and the involuntary; which include the heart and the blood-vessels. Show condition and hard condition must therefore be distinguished.

The fine-drawn racer carries no fat. The show beast will have as much as can be laid upon him without producing those unsightly puddings which too often mar his prospects of success when in competition with others more symmetrically fat.

The beginner in the show business is obsessed with the idea that successful exhibitors hold some secret and have a marvelous receipt which will effect their purpose. They do not. It is, however, an established fact that certain drugs known as alteratives and tonics can be made to assist in the conditioning process.

We will suppose a hunter in a soft, unfit condition that has been turned out to grass: has acquired a big barrel, and soft grass fat. If ridden at a trot for a mile he will be blown and covered with lather. He is manifestly out of condition. He will need a minimum of six weeks to be made fit for fast work without excessive fatigue, or there will be risk of congestion of the lungs or fever in the feet if put to his paces or any sustained exertion. In Great Britain, where so much hunting is done, a very high value attaches to the stud groom who can make horses " fit," as it is called, and this is how he generally proceeds. First he gives a rather large dose of aloes in a ball. (See Physicking, at page 363.) Then when it has set, he will give a pint or two of oats morning and night, and a few minutes' walking exercise. Day by day, the amount of corn and of walking exercise is increased. If the animal is very fat he may put on several rugs to promote sweating, but he will prefer to work off the fat slowly, if there is enough time before the day of trial comes. Not by any fixed rule applicable to all cases but by his own judgment and experience of other horses will he continuously increase the amount of corn and reduce the quantity of hay and long stuff, as he finds by watching the excretions if digestion is efficiently performed: so also will he increase the walking exercise, extending it to as much as two hours, twice a day, in the latter stages of the preparation. Very likely at the end of the third week the animal seems a bit cloyed and ceases to make continuous progress: then the studsman knows that he will make no further progress without a second dose of physic, and he prescribes a day on bran mashes and gives the ball, and resumes the feeding at just a little less than when he gave the ball. From this time the probability is that the belly begins to draw up, the muscles of the loin, the shoulders, and quarters fill up and commence to feel hard. The reason for so much walking is that he wishes to develop the forearm and the gaskins or second thigh, and until their condition satisfies him he will not trouble about faster paces. All this time he has been giving, two or three times daily, very small doses of so-called alterative condition powders (see Medicines, at page 445), as these influence in some unknown but demonstrable manner the metabolic functions. The tissues receive a greater power of appropriation of food and an increased power of eliminating waste (catabolic and anabolic power). Condition can and often is acquired without such artificial aid, but the experience of generations of men engaged in the work is in favor of drugs which enable the animal to be brought into the highest powers of muscle and wind in the minimum of time. The heart and lungs need conditioning as much as the motor muscles and it is necessarily a gradual process (see Congestion of the Lungs, at page 174). The final stages of preparation include some trotting, cantering, and a short hand gallop, before the racer is permitted to extend himself in the full gallop and exert his heart, lungs, and body to the fullest. It requires a very nice judgment to bring the horse to his best, and neither over-train or send out a horse imperfectly conditioned. Many racers break down in their training and have to be scratched. They will not stand the strain. The digestive powers fail, and they have to be thrown out of condition, which means a dose of physic to clear away the effects of so much hard corn, and a return to more natural conditions of bulky food and distention of the belly which are normal methods of life. As a matter of fact the best horse that ever ran cannot be maintained in high condition permanently. He must be let down at intervals and fill out his " tucked " or fine drawn abdomen.

Conditioning stallions for stud work is somewhat different. As a rule they need to travel considerable distances and should be both muscular and fat in order to bear the strain of service during the breeding season. The preparation is the same as regards physic and the use of alterative drugs, but they only need a moderate amount of exercise while conserving their sexual powers, which are apt to fade before the season is over. At first they are eager for the business, then they turn up their noses at what are called " milk mares " because recently foaled, and in season again, and presently go off their fancy to a great extent, or make half-hearted attempts and come down again from ineffectual leaps. They are often sustained in their sexual powers during the latter part of the season by giving nux vomica or aphrodisiac and mineral and vegetable tonics, but the practice of giving cantharides or other excitants is very detrimental, and corresponds to stimulation of the human brain by alcohol when more work is to be accomplished.

Show Condition.—The preliminary dose of physic both for horses and ruminants is desirable, as it gives increased power of assimilation. The same gradual process is adopted, or crop stickness delays the business, and the feeder learns the meaning of *festina lente.* Alterative tonics help the fatting beast to profit by more food, and so does a moderate amount of exercise. The custom of putting a lean beast into a pit and taking him out when the manure and straw has risen to the level of the floor above is fast dying out, and exhibitors have learned the value of regular but gentle exercise in the preparation of animals for the fat stock show. Without it they are liable to gouty joints and congestion of the lungs and fever in the feet. Joint swellings of a gouty, rheumatic kind are a frequent result of forcing young bulls too fast with stimulating food, and all who compete at shows must allow for considerable loss in this direction, and for many failures. The system of bringing young stock already fat is of course an artificial one, but he who would win at shows must violate natural laws and by artificial measures try to get in front of his competitors.

CHAPTER XV

PHYSICKING AND PURGING

Our grosser ancestors were much given to purging and to blood letting as antidotes to gluttony and excess in other things. In some respects the domesticated animals suffer as they did. We deprive them of their freedom, and give them an excess of concentrated or of rich foods. Those persons who too readily condemn drugging should bear these things in mind. The wild horse needs no ball of aloes. The domesticated one's life may depend on the administration of a purgative. Many ailments are combated, more prevented, by the timely dose of aperient medicine.

The old term of " physic " when applied to horses means a ball in which the chief constituent is aloes. A medium-sized animal may safely receive five drams, heavy horses, six or seven, and in some cases as much as eight. Two and three-year-olds should be given about two-thirds of these doses. Balls are made cylindrical for convenience of administration. They may be enclosed in paper or gelatine. Paper is not slippery, and generally preferred to the more elegant capsule which has certain advantages in keeping volatile substances longer. A five-dram physic ball is usually made up with a dram of ginger, some linseed or gentian and enough treacle, glycerine, syrup or other excipient to give it the consistence of hard cheese. Soft soap is a convenient excipient, but balls made with it become very hard if long kept.

Horses are Prepared for Physic.—This means that all dry food is withheld and only bran mashes and water with the chill off is given for a whole day before the bolus. A horse so prepared profits by a smaller dose of aloes, and is not so liable to be griped as if physicked while the alimentary canal is yet full of comparatively dry material.

Purging Cattle, Sheep, and Pigs.—Until comparatively recent years medicines were never given to ruminants in pills or bolus form, as it was supposed that the ball would be brought up in the cud. Now, however, we give balls of some substances, while adhering for the most part to the custom of large doses of saline substances plentifully diluted, because the volume of the stomach is so great and the ingesta within in ordinary times so large, that much medicine is wasted or absorbed by the undigested food. For this latter reason also the dose of any drug given to a horse is increased by one-third for a bullock: not that he needs much more to act on him, as can be shown by hypodermic or intravenous administration.

A cattle purge may be made of an ounce to two ounces or more of aloes, with three-quarters to one and a half pounds of Epsom salts, or Glauber's salts. Salines act best when very much diluted with water. A pound of salts in a gallon of water will prove a stronger purgative than two pounds in only just enough water to dissolve it. Less discomfort also results from the dilute dose; less chance of griping pains.

Sheep and goats take from a quarter to an eighth of the dose given to cattle, and are acted upon by the same purgatives generally, but it should be said that a larger proportion of aloes is borne. Two to four drams is not infrequently given to an adult.

Swine are for the most part acted on by the same aperients, but the difficulty of administration almost confines us to castor and linseed oil, croton beans, or oil, and the sulphates of magnesia and soda in solution, and mixed with food; or jalap and calomel.

Dogs are easily made sick, and some can vomit when they choose. If aloes is given, a dram for a medium-sized dog may be put in a gelatine capsule, and will probably be retained by the stomach. Castor oil and syrup of buckthorn, compound rhubarb pills, and those in common use, as liver or antibilious pills, may be given in doses proportioned to the size of the dog. It will have been observed that the dose of aloes stated above is very much larger than that tolerated by the animal's master.

CHAPTER XVI

BLISTERING AND FIRING

THESE practices strike the outside public as particularly cruel. That they cause much pain is unfortunately only too true, but the best men are agreed that they are indispensable in our present state of knowledge. The pain of firing may be greatly mitigated by local or general anesthesia (see Anesthesia, at page 389).

Blisters act in two principal ways. They bring to the surface or counter-irritate a more serious inflammation affecting structures beneath the skin. The mustard plaster endured voluntarily by the human patient may be taken as an example of the application of a vesicant, as when it is applied to the chest of a sufferer from a pulmonary trouble. As a means of relief to inflamed organs we use blisters or strong liniments with vesicating properties in varying degree. To act upon strained or inflamed tendons and joints we employ them, first with the above object, and secondly to excite absorption of inflammatory products, and lastly to thicken the skin and afford a more or less permanent bandage and support.

Firing has the same effect as blistering, and many surgeons add to its power by the application of a blister at the same time. The cruelty of this is doubtful, as there is a limit to the capacity for suffering, and a fired and blistered horse will generally commence to feed as soon as the opportunity is offered. The additional advantage claimed for firing is that the bandage is more lasting and stronger, as will be seen when it is understood that new skin is never formed, and the fibrous tissue which takes its place differs from skin in not being elastic.

Blisters are composed of a variety of substances (see Doses, at page 466), but the biniodide of mercury or red iodide has practically displaced all others in the hands of the veterinary surgeon, who employs it in various strengths for different cases.

Horses with thin skins are effectually acted upon by a mixture of one part by weight of biniodide, and eight parts of lard or vaseline; but one in six or seven is sometimes employed for a coarse legged animal with sidebones or similar ossific trouble. Tendons to be blistered need no greater strength than one in twelve. For the throat of a horse with laryngitis, one in sixteen will be strong enough, and this is about the proportion needed where a coronet is to be repeatedly stimulated to make it grow down better horn to cure sand-crack, seedy toe, and brittle hoof, or weak quarters.

The cantharides blisters are much liked by some old practitioners for soft structures, as broken down tendons, but they are sometimes absorbed into the system, and with serious consequences. Neither fly nor other blisters should be applied to a mare during the period of œstrum, nor to a filled leg, or to a pregnant animal under ordinary circumstances.

In order that a blister may act properly on a limb, it is usual to closely clip the hair. It is not absolutely necessary, if more material is employed, and ample rubbing given.

The patient should be secured in such a manner that he cannot do himself harm, either by rubbing his face against the blistered surface, or one leg over the other, or by striking the suffering limb against the manger or other solid body.

The early morning is a good time for this performance, because the pain will have abated before the attendants retire to rest, and the animal can be kept under observation and restrained from any passionate effort to break away.

Two halters, one of which should be put on left-handed, answer the purpose better than rack chains, as the latter may break with a jerk of the head. They should be attached to the pillars on either side of a not too wide stall, if a front leg is to be operated upon. If a hind one, he may be tied up short to the rack. A bandage on the leg not under treatment will protect it from injury. A humane man will divert the animal's attention from time to time with handfuls of hay, and a bag or basket can be slung in front of him. Water should not be forgotten.

A blistered animal should be kept under restraint for at least twenty-four hours, or he may do himself a mischief by rubbing. It is no great trial to a horse to stand for two or three days and nights, as he can lock his joints by leaning a little in a backward direction, and sleep as usual. It is not perhaps generally known that horses in ships stand for weeks together, and that some working animals never lie down.

Dressing a Blistered Limb.—We are all tempted to do this too soon, as we wish to minimize the suffering of the poor beast, but there are not wanting authorities who can give good reasons for not washing the parts at all, and for not applying lard or oil or other emollients. They say that the hard crust formed assists by its pressure to excite the absorption of inflammatory products underneath, and that we are not getting the full effects of a blister if we remove them. Most men will prefer to dress as above indicated, however.

The patient may be allowed his freedom to lie down and to walk round a loose box if a cradle is applied round the neck. This consists of a number of sticks tied together or attached by holes through which string is run and fastened off. The sticks composing the cradle must be so arranged that the animal cannot gnaw the irritable member.

The benefit of a blister is greatly enhanced by a long rest: the longer the better, as it is in the final stage when most of the absorbent work is effected.

Mustard is applied at about the consistence usually prepared for table use, and there is no advantage in using hot water. The operator's eyes suffer unnecessarily.

The strength of a mustard application may be increased by the addition of vinegar or turpentine. Mixtures of the latter are best calculated to act on the sides of the chest and belly in cases of inflammation of the lungs or abdominal organs. In washing them off with warm water, care must be exercised not to chill the animal, and a warm rug should be placed over the cleaned parts.

A sheet of paper over the mustard saves the rugs or coverings, which may otherwise need washing, just when they are most wanted.

Mustard may be made to act a second time by rubbing warm oil into it, and this is a better plan than putting on a second plaster when the first proves ineffectual. It saves blemishing.

CHAPTER XVII

OPERATIONS

The major operations upon animals should be entrusted to a surgeon if possible, but the circumstances of animal owners are such that they are often compelled to undertake them themselves or see the subject die or become useless. To say what are major and what are minor operations is difficult, as some handy men we have known have undertaken successfully what the duly qualified practitioner will hesitate about. While writing the above words I am reminded of the theological student who was "stuck" when asked to "name the major and minor prophets" and declined on the ground that he "did not like to make invidious distinctions." We will leave it at that, and describe the methods of castration, and some other operations which stock owners ought to be able to carry out, whether obliged to do so or not.

Castration.—Of the necessity of this operation there is no doubt, although custom varies greatly even in this important matter, and until quite recent years entire horses were used in the omnibuses of Paris and other European cities. In Great Britain one rarely sees an entire horse that is not kept for stud purposes.

The time usually chosen for castrating colts is early summer, when the animal is a year old. The testicles have been withdrawn and should have again descended: while the sexual instinct is hardly as yet awakened. The absence of flies is another reason for being early; not the fear of a high temperature, as colts do well in hot weather; lambs in cold; and calves may be emasculated at any time of year unless an east wind is blowing cold.

The standing operation was first popularized by Farmer Miles, it may be remembered, and this "amateur" was so highly appreciated that his services were sought in Europe to teach the veterinary profession. The principle of his ecraseur is still that which prevails in the instruments which are thought to be improvements upon the original, but the trapping in caustic clams while the animal remained upon his feet was the innovation of chief importance.

It cannot be said to be a merciful method. It is not so much so as the red-hot iron, for reasons which will presently be seen.

The colt is fasted more or less by way of preparation (he should be fasted twenty hours if casting is intended) and then placed against a wall with a strong ring staple in it, to which is attached a rope passing round the animal's shoulders and enabling the assistants to exert a measure of control, while others press against the hip, and another person governs the twitch upon the animal's nose. The operator approaches from the near side (the colt's left side) and seizes the scrotum in his left hand, squeezes it so as to tighten the skin over the testicles, cuts through all the coverings by a single stabbing motion of the knife held in the right hand, first letting out one organ, and then the other. The testes thus uncovered hang free, and the cremaster or retracting muscle is soon wearied and they are not drawn back. The operator then fits on his caustic clams to do the work of destruction, or he uses the instrument which crushes and squeezes the tissues together slowly and ultimately divides them with but trifling hemorrhage. If the instrument is not used, the caustic clams are left on for a variable period of one to three days: the time occupied depending somewhat upon the degree of pressure and the activity of the destructive agent (see Caustic Dressing Powder, in Miscellaneous Recipes) with which the clams have been prepared. It is usual to remove these carefully, but in the back blocks where animals can only be rounded up for special occasions, wooden clams of cheap construction are often left to fall off of their own accord.

What has been described is the rough and ready plan, but surgeons adopt antiseptic precautions and wash and dress the scrotum with a carbolic or other lotion and soften the parts that will probably swell, and withdraw the penis and clear it of the sebaceous material which accumulates even in young horses, and then freely lubricate the inside as well as outside of the sheath to facilitate the passage of the yard. The standing method makes these detailed attentions difficult to carry out, and they are usually performed in a rather perfunctory manner. The chief object attained in the standing operation is the avoidance of risk of broken back or serious injury to the spine, which sometimes—rarely, it may be said—happens, when the old plan of casting in ropes or in hobbles is adopted.

On the other side of the account there is more risk of overlooking a slight hernia, and we have seen valuable animals with the intestines under their feet the next morning, and with no choice but to kill them.

The Actual Cautery.—The oldest method (if we except the Oriental custom of mulling) is still preferred by most operators, including many who have tried the standing operation: the ecraseur, and the caustic clam. For this method of operation it is necessary to cast the animal in ropes or in hobbles. A plain wagon rope has always proved best in the writer's hands, but it must not have been knotted or clumsily spliced, or it won't run at the critical moment. (See Methods of Control, at pages 413-418.)

Having secured the animal upon his left side, his feet well drawn forward, we examine the scrotum with care to satisfy ourselves that no knuckle of intestine is extruded, and that both testicles are within reach. It may be necessary to wait a minute for a demonstration of this, as the frightened colt draws them up by the cremaster muscles, but cannot hold them long, and if they are once seen, the castrator knows he will be able to get them. He cleans the scrotum and uses a mild antiseptic, such as a four or five per cent. carbolic lotion: not oil, because things are slippery enough, and there is a lot of sweat rolling off owing to the fright the animal feels. One testicle at a time is squeezed against the covering scrotum (the under one should be taken first) and a long clean sweeping wound made by a single stroke of the knife that will give ample room for the organ to escape and allow for drainage afterwards. A neat operator does not like to see the testicle itself wounded, but the beginner had better do this than make two or three cuts, which cause more pain and leave a less desirable wound for healing. The metal or wooden clam with some castrator's ointment smeared between its jaws and upon its upper surface is then applied round the whole of the tissues above the testicle, which latter has been pulled until it ceases to draw back. The jaws are tightly closed upon the spermatic artery, cord, vein, everything which previously communicated with the organ, and here ends the pain of the actual operation, for there can be no pain beyond the pressure of the clams. The hot iron is then employed to slowly divide the testicle from its connections: the last and greatest amount of attention being given to the open mouth of the spermatic artery, which will be seen to exude drops of bright red blood, and will turn yellow with the searing iron, and so shrink under its influence as to arrest hemorrhage when the clam is presently removed. The iron should be very hot while dividing the tissues, but partly cooled when applied to the artery. Precisely the same performance is gone through with regard to the other testicle. A careful operator slowly opens the clams, and if blood from the artery is seen to well up, tightens them again, and applies further heat: perhaps adds some powdered resin, and sears again. He will not finally remove the clams until fully satisfied that the artery is not going to break out bleeding when the colt gets up and he has lost control. It is just as well to linger over the subsequent cleansing of the blood from the thighs and introduction of a little ointment into the purse, or the clot that forms there from the divided vessels of the scrotum, before allowing the victim to rise. Nor should he be hurried up if disposed to remain on the ground, as time favors the necessary congelation which prevents hemorrhage. It may be remarked that a certain amount of blood will always fall out when the animal rises, and that a little trickling stream is rather desirable than otherwise, as it is less likely that clots will be formed and decomposed in the scrotum, and subsequent swelling will not be so great as with a dry operation.

Castration by Ligature.—This is the method frequently adopted for mules and asses in France and Spain, and for these animals has a special recommendation, because the artery of the cord is so rigid that it refuses to seal up when treated by the hot iron, and the open mouth merely retreats in many cases: behaving quite differently from horses. It is a very cleanly and apparently scientific plan; bulls, rams, and goats, can be simply ligatured and let free until the testicles drop off, and the wound heals up. There is, however, a very serious objection in the greater risk of tetanus or lock-jaw which is universally agreed to exist.

Trapping.—In some countries, and among savages, the whole scrotum and its contents are included in a ligature, or between wooden clams, such pressure being exerted upon the enclosed tissues that the whole apparatus in time falls away. It would seem to be the most painful and prolonged of any, and we have seen rams so mutilated in England and the string put on in such a manner that it would slack out and not complete the severance of the organs.

Mulling.—This is the operation referred to in the book of Leviticus when objection is taken to a sacrifice that is not without spot or blemish "or having his stones broken." In hot countries, notably in Arabia and some parts of India, the poor beast to be made neuter is secured, and his testicles hammered with a stone from outside the purse, until crushed into pulp, without using sufficient force to break the skin of the scrotum. It is an awful practice, from which the Occidental mind recoils with horror, but has the merit of preventing the fly from striking or the bacillus of tetanus entering in.

Calves and lambs, bulls and rams, are anatomically somewhat different, and may be castrated in a variety of ways. The general custom is to operate at a very early age when the organs are undeveloped and the pain caused is much less than in adults, but bulls and rams may be saved for the stud and then found unsuitable and have to come under the knife when a year old or more.

Having secured the animal, the scrotum is stretched tightly over the testicle, and a long bold stroke of the knife releases it. It is then drawn out, and the part which does not contain the artery is first divided by the sharp knife: then the organ is pulled out as far as it will come without breaking: then twisted around and around until some strain on the tissues is felt: then scraped through with the heel of the knife, which is purposely kept blunt. Finally, complete separation is effected. The incisions in each half of the purse have been long and free, but this is not deemed enough for drainage, so the operator cuts through the partition, and then dresses the purse both inside and out with the green ointment before releasing the subject. (See Castrator's ointment, at page 467.)

For older animals it is well to use the searing iron in the same way as advised for colts: always taking care to leave ample drainage, for it is from clots which decompose that almost all the deaths occur after castration.

Lambs.—Young lambs are held in such a manner that the operator can stand in front of them and with a rough-edged shoemaker's shear steel knife, cut off an inch of the purse when drawn out to its fullest extent by the other hand. This exposes the ends of both testicles which are still covered by the inner investments. These may be cut through in order to liberate the organs separately, and use an instrument to pull them out and strain on them until the cord breaks, or the shepherd will more probably seize each testicle with its investing membrane in his teeth, and slowly draw it out with a backward movement of the head until it breaks away. Older sheep are operated upon with the iron, in the way recommended for bulls, but sheep are very liable to septic poisoning, and clotting is so much to be feared, that it is well to cut through the divisions between the two halves of the purse, or else take away the end as with lambs. Some castrators use the hot iron throughout: employing it to open the scrotum as well as to divide the cord. The edges of burned wounds are in no danger of sealing up immediately and enclosing the dreaded clots.

Pigs are the easiest and safest of all animals to castrate and the preliminary methods are the same as those mentioned for other animals, but many amateurs simply hack off the testicles without first separating the non-vascular portion and cutting it, which is the proper way; after which the part containing the artery should be stretched before dividing with the knife.

Dogs are very apt to bleed, and the hot iron is the best method for operation. If ligatured they constantly lick and do damage. Cats are castrated in the same way as pigs, but an old tom should have the iron, or he may bleed when liberated.

What has been said of sheep applies equally in the case of goats.

Spaying.—The operation of unsexing females is called spaying and is most practised upon pigs. It is not one the amateur should attempt unless he is willing first to practise on warm dead subjects to give him an accurate notion of the situation in which the ovaries are to be found. The site for incision is about midway between the last rib and the point of the hip. With the animal's hind-legs stretched out and the skin of the belly rendered tense, the spayer makes a bold incision right through the skin and abdominal muscles, and often through the peritoneum or lining membrane of the abdomen as well, but this latter structure even with practised spayers generally receives another cut to admit the forefinger, with which he gropes for one horn of the uterus, and having found it, brings it into view and then—not hand over hand, but finger over finger—collects the whole body of the uterus from the bifurcation backward, including both ovaries, which have an attachment inside that must be cut or torn away, and having viewed the whole, he cuts it adrift and directs his assistant to bring forward the top hind-leg, while stitches of thread are put in the flank; not through the abdominal muscles, as might be supposed, but through the skin only. The fact of the wound in the belly not being opposite that in the skin, is enough to prevent escape of the intestine. (The stretching of the hind-leg previously mentioned is the cause.) Pigs to be spayed should be well fasted, or some risk of wounding the bowel with the knife is entertained, and a disposition to rupture favored by a full belly. All animals of both sexes are best operated upon on an empty stomach and not too distended abdomen.

Spaying cows is practised in some countries and is performed in the same way through the flank by the majority of operators, but there is a more scientific (?) way of doing it through the vagina, which the writer does not advise, as cows suffer much at the time, and more afterwards, than by the old method through the flank. Cows often continue to yield a profitable amount of milk for two years and upwards if spayed, and, like all neuters, have a disposition to put on flesh. Of all animals to get fat, after castration, the dog stands conspicuous; this remark applying equally to spayed bitches. There is no female animal so much benefited by spaying as the cat. She makes an ideal pet: is always happy, and retains her kittenish ways until advanced in years. Truly, " care killed the cat," and if once deprived of the sexual instinct, her cares cease. The novice who wonders how such an operation as spaying can be performed on the cat need only refer to the chapter on Anesthesia, and another on Methods of Control.

Bleeding.—Phlebotomy, or the letting of blood from a vein, bids fair to become a lost art, yet it is a most valuable one in some cases, as the reader of this book will have concluded if he has studied the subjects of staggers—stomach, sleepy, or mad—and other forms of congestion where the brain would regain its functions if relieved from pressure, and the heart could deal with a less quantity of blood while quite unable to propel the stream through congested pulmonary vessels. There are times when prompt blood-letting means the saving of life. It is true that other means bring about like results, but they take time, much time, as compared with the relief afforded to the congested brain when a jugular vein is opened. "The abuse of a thing is no argument against its use," but it is a potent factor in making or unmaking a fashion. I would advise every young farmer to learn how to bleed, but having done so, to practise it only in rare instances. If he only does it once in a lifetime and saves the life of a horse worth $500 it will have been worth learning.

Bleeding is practised by surgeons both for local and systemic reasons. It may be to ease fever in the feet, and the toe vein will be opened, or congestion of the lungs, the liver, or kidneys, in order to reduce the whole volume of blood in the body, and so favor the suffering member.

Bleeding from a vein is a comparatively simple matter. All that the operator has to do is to dam the stream by pressure while making a puncture with a clean lancet or very sharp-pointed knife. Pressure of the thumb on a vein, like that at the angle of the eye, will suffice to make it visibly fill, and then is the time for the necessary prick. The large superficial vein of the leg on the inside (vena saphena) may be pressed, or a cord wound round the leg, if it is desired to bleed for big-leg or grease. The largest and most convenient veins for reducing brain pressure and obtaining systemic effects by bleeding are the jugulars, situated in the furrows of the neck on either side of the windpipe. These can generally be raised by pressure of the thumb, but a more reliable way is that of placing a wine cork in the channel and winding a stout cord round the neck and over the cork: the pressure of which ensures the filling of the vein, which stands up like a cart rope, and is easily punctured in proportion as it is fully distended. It is a half filled vessel that yields instead of receiving a puncture when the lancet or the fleam is driven in by fingers or blood stick. When the desired quantity of blood has been taken, the wound should be secured by a pin transversely to the course of the vessel and around it some tow or soft material of the kind, wound in form of a figure of eight. Next day the pin is gently removed, and the tow drops away soon after. Needless to say, the greatest attention should be given to instruments employed, or septic matter will be introduced into the vein and inflammation follows. An inflamed vein is best treated by a blister along its course, with the object of obliterating or consolidating it, and throwing the work upon others. Impervious jugular veins were not infrequently met with in the days when the fleam and blood stick were too much employed.

Scarifying is one of those minor operations the amateur should be able to perform. By this term is meant a number of clean punctures for the relief of such conditions as inflamed palate, generally called lampers, for swelled sheath, for tumefied membranes, such as have been referred to in eversions of the gut or the vagina or womb. A painful local swelling is often reduced in this way and fomented and anointed afterwards, as in the case of a horse's penis swollen so that it cannot be retracted. (See Phymosis and Paraphymosis, pp. 193, 195.) Tumors and warts of various kinds can be operated on by the animal owner who has read the simple instructions contained in this book. Many of them have but small attachment, and the risk of uncontrollable hemorrhage is rather imaginary than real. When animals bleed to death it is through neglect or over-confidence in not carrying out the directions which will be found at page 393 on Loss of Blood or Hemorrhage.

The opening of abscesses, and of cysts, or big knees of cows, or other swellings is a safe enough procedure if the operator will always bear in mind the propriety of keeping his cutting edge upwards and outwards. Don't " hit a knife into it," as some provincial English say, for in that manner a little pus bag on a joint which would have broken of itself may be the indirect cause of the death of the beast, by opening the joint.

The operation of tracheotomy has been described at page 169 and is one of those the amateur should be able to perform to save an animal from suffocation. See also Roaring.

Setting broken limbs or putting up fractures will be found at page 314.

Docking.—Docking is, in a few cases of harness horses, a necessity, but is usually performed at the dictate of fashion, and chiefly on hackneys. It may be done at any age, but if while the animal is quite young, the stump or end of the tail has a better appearance. The division should take place between the bones, as the healing process is retarded if a portion of a coccygeal bone has to slough out. If the operator misses his mark, and such piece of bone is seen to be there, he should extract it as soon as he can; which is when it begins to die. Whether a proper machine is used, which is a miniature guillotine, or an axe, or strong knife, the parts should be clipped to make it easier to divide the tissues. The long hair is first turned back and secured by tape or plaited with straw, and covers the end of the tail again when let down. Whatever instrument is chosen, the severance should be accomplished by a single effort, as causing less pain and favoring a better healing. The arteries spurt blood and need to be sealed. Some do this by pressing a red hot iron against the stump; others by ligature, and many by binding up with a styptic. The hot iron *looks* very barbarous, but those with greatest experience favor it as the most truly aseptic method and requiring no further attention. The addition of some powdered resin helps in the sealing of the vessels.

A ligature above the site to be operated upon prevents hemorrhage, and if left on, will presently slip over the end when the tissues have sloughed, but it is the least satisfactory plan, and much swelling often takes place above the dock, and a larger number of cases of tetanus or lockjaw follow ligatured docks as they do ligatured spermatic cords. (See Castration, at pages 368, 371.)

The writer has done a great many without the iron or the ligature, relying on a clot to stop the bleeding. A tampon of tow or cotton wool soaked in perchloride of iron is made ready for instant application, and the tail hair let down over it, and a string tied tightly as close up to the stump as possible. A little blood will at first come through the bunched up tail hairs, but a large clot is presently formed and the bleeding ceases. In the case of yearlings, or suckers docked at the time of castration, a little wool soaked in carbolic oil has been found enough. The binding material has only to be cut next day, and the animal gets rid of the tow and the clot by the ordinary movements of the tail. The stump heals very much quicker than in those cases where the hot iron is used, and an adult horse does not shrink from the harness crupper so much, or fear handling by his groom. He sooner forgets the trouble. In fly districts, a docked animal should not be let out until healed. Dipping the tail in melted tar is more or less of a protection where the circumstances compel docked animals to be set free immediately.

Lambs have been docked for countless ages, except among a few tribes who specially value a fat tail as a delicacy for the table. It is necessary, to prevent discharges festering and adhering to the tail and inviting fly blow. To those who have not done this operation we would say, have a leather-cutter's shear steel knife, and frequently rub it on a scythe-stone to keep a rough edge. Have the lamb held in front of you, and cut from the under or wool-free side, and go through by one hard and downward movement. Don't ligature unless you see a fainting lamb still bleeding. (See Castration.)

Unnerving, Neurectomy, Neurotomy.—An operation known by the above names has been referred to in connection with navicular lameness and sidebone and other incurable diseases, and consists in dividing one or more trunks of nerve of the purely sensory kind, in order to cut off all feeling from the seat of pain. This done, the animal goes sound again, although the malady is not removed. The ulcerated navicular or shuttle bone does not repair, nor does the side bone or ringbone disappear; it is the pain that is no longer felt, which enables the animal to resume a fearless tread, and regain most of his former action. In order to divide the various trunks of nerve the operator must be a good anatomist and surgeon, and no amateur would think of attempting so delicate an operation without such instruction as would take him quite out of that class. (See Navicular Disease, at page 353.)

CHAPTER XVIII

DISEASES OF THE EYE

THE organs of special sense are not so liable to disease or failure in animals as in man. Those of the eye are all we need consider; deafness being extremely rare, and when occurring in dogs and cats is usually secondary to some malady such as canker, which has been considered under that heading. Odd colored eyes in cats are often associated with deafness, but the reason is not known. A "wall-eyed" horse, on the other hand, has never been known to be deaf so far as we can ascertain from the literature of the subject; indeed the author has never yet met with a truly deaf horse, although he has been knocked head over heels in his own stable by carelessly approaching one asleep on his feet, and taken by surprise.

In order to understand the common diseases of the eye, the reader should inform himself of its structure, in a general way, by making a section of a bullock's eye when slaughtered, and by examining the illustrations accompanying this chapter. The eye is an optical instrument through which impressions are conveyed to the brain, and if anything interferes with the apparatus those impressions are blurred or obliterated. The fine membrane covering the front of the globe and reflected over the lining of the lids is called the conjunctiva, and is of importance to the veterinarian quite apart from its diseases in being an index to febrile and other disorders. To it we look for evidence of high temperature, when it is said to be "injected." This means the distention or engorgement of its vessels when a bodily organ is inflamed or a specific fever is endured. It may show spots, as in purpura, or tell us of debility and want of red blood in the body, by its pallor, as in rot of sheep or the anemia of parasitism in colts robbed of their food or prostrated by illness, or weak from starvation.

Ophthalmia, or Simple Inflammation.—Horses and cattle are subject to conjunctivitis or inflamed membrane, by reason of external injuries, as the flick of a whip or the presence of a hay seed or a fly. Sheep, especially yearlings, are frequently the victims of an eye blight, as it is called, when climatic conditions bring on inflammation of the conjunctiva and it spreads rapidly through the flock. It is probably due to some micro-organism that has not been identified.

The symptoms of ophthalmia need but little description, as they are apparent to anyone. Intolerance of light, swelling of the eyelids, falling of tears, and closure, are the prominent ones.

Treatment.—It is important to make a careful examination for the removal of foreign bodies. We have known a dog with a hay seed in his eye for a week, and a doctor in attendance without seeking it. Such conduct would disgrace an amateur nowadays when by the use of cocaine he can deprive the eye of sensation and explore under the lids. A seven per cent. solution dropped into the eye will enable one to examine it in about seven minutes. With the removal of the foreign body, recovery takes place rapidly, unless it has been present long enough to have wrought injury to the structures. Bathing with warm water containing four per cent. of glycerine will soothe the irritated membrane. Inflamed eyes caused by cold draughts of air need only the same treatment.

If a foreign body or a blow from the whiplash has scraped off the epithelial covering, the inflammation will be more acute and the cornea, which is the denser membrane under the conjunctiva, will participate in the trouble, and between its layers will be deposited a milky looking fluid (lymph), causing for the time more or less blindness, since it acts as a curtain to the window.

When the preliminary inflammation has passed off by fomentation, and protection from the light, the opacity is disposed to go away by absorption of the lymph, but the process may be greatly encouraged by the use of a lotion, at first of two grains of sulphate of zinc to an ounce of distilled water, and later, when the edges of the cloud have lifted, by a seven per cent. protargol solution in water, but a persistent white spot remains in the center. This form of silver solution does not stain, but nitrate of silver answers the same purpose where a dark-colored face is concerned. If a thorn or other body has done much damage there will finally remain a white spot which is the equivalent of a scar or cicatrix in the skin where a wound has healed, and nothing will remove it. These nebulæ or permanent opacities are frequently spoken of as cataracts, but it is quite a misnomer, as will be seen when that disease is considered.

Constitutional or Periodical Ophthalmia.—This is confined to equines and is of less frequency than in the days of close stables and ammoniacal vapors, and the exclusion of fresh air with a view to keep the building warm and prevent the growth of coat needing to be removed by the laborious process of clipping with scissors. This disease has been called moon blindness from its tendency to recur about once a month, originally. The causes are not accurately known, but it would seem to be a rheumatic one, or some imperfect metabolism whereby products are left in the blood which have a specially deleterious influence upon the eyes. The symptoms are much the same as in ordinary ophthalmia but somewhat less acute. The deeper structures of the eye are included in the inflammatory process, and certain definite lesions may be expected to follow. Each attack leaves the sight further impaired and complete blindness is the final result. When prepared by cocaine, a view can be obtained of the chambers, and an orange tint will be observed to pervade them, and more or less milky fluid is disseminated throughout the structures. The lens and iris become attached by bands of lymph, which restrict the movements of the latter, and prevent the circular fibers from closing the pupil, and the radiating ones from enlarging it. A horse may appear to recover from the first attack completely, the inflammatory products quite disappearing, but the expert will detect a peculiar puckering of the eyelids: a three-cornered opening between the lids instead of the usual crescentic one. This is one of the things a veterinary examiner as to soundness has in his mind, that the amateur would not think of.

Treatment.—That the disease is of a gouty or rheumatic origin seems to be confirmed by the better results obtained from modern remedies directed against those maladies, than from the older methods of treatment. Two or three two-dram doses of acid acetyl salicyl, twice a day, or three times in twenty-four hours, has a good effect. An aloetic purge may be given at the same time, as it lowers tension in the blood-vessels, and causes a diversion. Iodide of potassium in two-dram doses extending over two or three weeks, is also calculated to eliminate morbid products from the system.

Ulceration of the Cornea.—Either from a severe injury, or from chronic causes of a constitutional nature, the cornea is liable to ulceration. (See Ulcers, at page 254.) In horses it is most often caused by accidental injury. In dogs, as a result of distemper or malnutrition. Many cases of the kind occur among the black races in times of famine.

Treatment.—The object of treatment is to save rupture and escape of the aqueous humor in the first instance, and in the next to secure repair with the minimum of cloud or opacity interfering with vision. The constitutional treatment will vary; a full-blooded animal needing a good purgative, or repeated saline doses, and the famine-stricken or debilitated by specific disease, requiring tonics and highly nutritive food in easily assimilated forms. The ulcer needs an astringent or mild caustic that will arrest the disintegrating process and excite the languid wound to reparative efforts. If a four or five per cent. silver solution is employed, one may be sure of destroying any septic or destructive organisms that are playing a part, and of stirring up the latent powers to repair of the breach. Touching with a small brush dipped in the solution, or dropping from an ordinary pipette is the usual way of dressing. In a few cases a light touch from a solid caustic point is desirable, but this should be practised with caution. A fresh and healthy redness, a zone of new inflammation, will indicate a desire for reunion, and the caustic applications will be withdrawn and the cicatrix left to complete repair of the breach before attempts are made to excite absorption of the excess of lymph remaining. Mild lotions of two grains or more of zinc sulphate, dropped into the eye daily, have this effect, and from the edges of the cloud the opacity begins first to clear up, and finally only a scar is left. Iron, quinine, gentian, the compound syrup of the phosphates, Easton's syrup; these and similar tonics undoubtedly help in those cases where debility has been the cause of the trouble.

Spots on the Eye. Albugo, Clouds, Nebulae.—The chief causes of these opacities have already been mentioned in connection with inflammation of the cornea and ulceration, but the owner of an animal often has no cognizance of the cause and thinks to remove a blemish without regard to its origin. If of recent occurrence and from trifling injury which did not attract attention, it will probably clear up of itself. The eye blights of lambs do this, and the animals do not starve for want of sight to find their way to the trough, or select plant food, as their sense of hearing and of smell is enough for the purpose.

Treatment.—The solutions of zinc sulphate and of protargol advised in connection with ulceration and inflammation may be tried, but readers are cautioned against the cruel practice of blowing powdered glass and other irritants into the eyes.

Grape or Staphyloma.—A gray or bluish white tumor on the front of the eye, and assuming more or less the shape of an unripe grape, is called by the foregoing names. There is no species of animal exempt from them, but they are of more frequent occurrence in cattle, dogs and cats than in equines. A curious and by no means rare complication in cattle is the presence of distinct hairs sprouting out from them, and not distinguishable from those growing on the skin. As a sequel to distemper, both dogs and cats are frequent sufferers. The word tumor used in the above sense does not necessarily mean a growth of morbid tissue upon the cornea, although that is often the case; it may only refer to a bulging of the aqueous humor from a dropsical condition of that fluid, and a weak covering membrane. In that case it is often subsequently absorbed, when the young animal outgrows a period of debility. Buck-eyed colts and calves, and dogs of the prominent-eyed breeds are liable to this defect, and should receive special care as to their general health and diet.

Treatment.—Where a positive growth exists it is in most cases desirable to operate. One may let the fatting calf or the beast that is already forward in flesh finish his short career without interference, but a horse or dog or cow will need the surgeon's knife deftly employed to cut away the growth while the eye is anesthetized by cocaine or the subject is under complete control by general anesthesia. (See page 389.) Some of these growths upon the globe may be kept in check by applications of stick nitrate of silver.

Clumsy operators or rash users of caustic will only succeed in letting out the contents of the aqueous chamber, and the last state of that animal will be worse than the first.

Diseases of the Humors of the Eye.—The front chamber is filled with a fluid like water. The larger and posterior portion of the globe is occupied by a transparent substance like molten glass, and for this reason is called the vitreous humor. Any change of composition in these humors is liable to result in blindness, partial or complete. Blows or other causes of inflammation, or hemorrhages into the anterior chamber lead to discoloration, and unless the effused material is rapidly absorbed and carried away, permanent results must follow. If blind eyes are looked into by the student he will see substances varying in color and consistence from that of a grayish pearl to a blue or purple mass. The denser portion of an oyster most nearly resembles an eye consolidated by chronic disease, but no longer in active inflammation, while a variety of shades may enter into it, especially when the result of constitutional ophthalmia, which see, at page 381.

Glaucoma.—The vitreous humor referred to above usually changes in old age and is the chief cause of impaired sight in aged dogs, and to some extent in horses. Such senile decay cannot be prevented, but a blueness or yellow degeneration in younger animals is occasionally caused by disease. The humor which is so much like molten glass is held together by a transparent hyaline membrane and this it is which undergoes structural modification as a rule.

No specific treatment is known, and only attention to the hygienic conditions can be advised. It has been supposed that iodides of iron have some good effect, but it is very doubtful if any treatment is beneficial. A few cases, following on some illness in the young, have recovered, but they would probably have done so with or without treatment. The thing of importance is to be able to recognize this disease and not buy a horse or a dog with the defect.

Cataract.—This is not an opacity on the front of the globe nor a film over the eye nor a white spot upon it, but a change within the eyeball. It affects the covering or capsule of the lens, or the lens itself, or both. Surgeons distinguish between capsular and lenticular cataract. The amateur will have no difficulty in locating cataract if he has taken our advice and cut through a dead eye. The lens is the transparent body which slips through his fingers. Its position in the eye is between the aqueous and vitreous humors. Deposits upon or within the lens, of lymph, which become permanent, constitute cataract, with various changes and modifications, but rarely indeed is a cataract cured save by surgical operation. In this disease of the eye as in other deep-seated structures there may be a certain amount of clearing where young animals have recovered from a constitutional disease which gave rise to it, but treatment of any kind is of little use. The veterinary student is more concerned in recognizing its presence and rejecting an animal with such an unsoundness. Cataract may be so diffused over the whole lens as to cause total blindness, but more often it affects only a part, and it is rather remarkable that horses with genuine opacities of the lens are less disposed to shy than those with superficial opacities of the cornea. In some way they get accommodated to the obstruction to their view, and many animals remain apparently sound so far as their owners are aware, although limited cataracts are present. There is no inherent difficulty in the operation for the removal of cataract, but animals are not so treated for the simple reason that they would have to wear spectacles like their masters, if the lens was subjected to the same surgical measures. In order to examine a suspected eye, one should drop a little atropine into it and wait for the dilation of the pupil. Veterinary surgeons seldom need ophthalmoscopes or other aids to the naked eye to detect this disease, but employ such help when cases are in dispute and it is necessary to make a specially minute examination.

Iris.—The iris is the colored portion of the eye and consists of two orders of involuntary muscles, circular and radiating. When the first contract, the pupil is made smaller. When the radiating shorten by contraction, the pupil is enlarged. These respond to light, more or less light being admitted according to the dullness or brightness of the weather, or illumination by artificial means. The rapid response to an electric lamp in a dark stable will mean a good deal. A staring pupil although exposed to sunshine means still more. In diseases of the eye such as periodic or constitutional ophthalmia, and in inflammation excited by blows, the iris is liable to be entangled by lymph which, becoming organized, finally fixes the pupil. When, therefore, an animal's eye is inflamed in its deeper structures (not simple ophthalmia or inflammation of its appendages) the doctor must be on his guard to prevent this sequel. It is done by introducing alternately such agents as expand and contract the pupil. Atropine and morphia act in this manner on the radiating and circular fibres. The iris is seldom the seat of disease *ab initio,* but is frequently involved for the reasons given above, and no matter how well the other structures may recover, if the iris is fixed, the retina will be exposed to such strong light as to become paralyzed; hence the importance of keeping it in mind when treating diseases of the eye.

Glass Eye, Amaurosis.—The expansion of the optic nerve on the back of the eye is called the retina and conveys to the brain the sensations which we call sight, by means of the trunks of nerves which have their deep-seated origin in the brain substance (optic thalami). If the retina or the trunks of nerve do not carry these impressions, the animal fails to see, just as he does if any object like a cataract interposes between the retina and the outer world. Failure of the optic nerve does not interfere with the transparency of the organ, but the subject is blind. The unintelligent stare has been likened to that of a glass eye: hence the popular name for this trouble. We know that amaurosis follows on blows and falls and that any failure in the circulation of the blood in the brain induces temporary glass eye. The darkness which overtakes a person in a faint is due to this deprivation of blood from the optic thalami, but of the other causes of glass-eye we know no more than can be seen with a glass eye. If we enlist the microscope to aid our vision we can discover nothing in the nerves that have failed to carry sensation, whether the special sense of sight, or of motor power to the voluntary muscles. (See Paralysis, at page 157.)

A few cases recover, but these are exceptions and may be assumed to be due to absorption of clots or effused fluid, the pressure of which interrupted the current while it lasted.

Squinting, Strabismus.—While removing an eye from a dead subject the student will have noticed the thin expansions of muscle which direct the organ to right or left, upwards or downwards, or obliquely. If the inner or outer rectus muscle is stronger than its fellow, the animal will squint inwards or outwards. Internal strabismus is the more common defect in both man and beast. In puppies and pigs and in some other species this is observed during distemper or while influenced by fits, but it usually passes off. When a squint is permanent, the subject of it learns to rectify his vision by making unconsciously some allowance for distance, and does not miscalculate the position of things and collide with them, but his manner is at first timorous and he is apt to be pushed aside by the stronger members of the family.

Treatment.—Few owners will think it necessary to operate, but a good surgeon can generally rectify the matter by dividing a few fibres of the stronger muscle. This is one of the *little* operations that *big* reputations are made on.

Diseases of the appendages of the eye often give trouble. Malposition of the lids is one. Turning in of the lids and contact of the lashes with the conjunctiva sets up chronic inflammation and should be remedied by bending the lashes upon a penholder to give them a different direction; or failing by this means we may cut a "V" in the margin and by stretching the wound two or three times while healing, get a filling up which adds to the length of the lid.

Sore Eyes.—The eyelids of dogs and pigs are liable to inflammation of the little glands whose office it is to produce a greasy smear around them and keep the tears from falling over the cheek. This is the trouble in old people with "rheumy" eyes. In animals it almost always yields to treatment with a weak nitrate of mercury ointment; one part mixed with five or six parts of vaseline, applied at night.

Warts on the eyelids give rise to much trouble. They can always be removed (see Warts, at page 271), but special care must be taken to avoid injuring the eye itself. Snipping out with very sharp embroidery scissors or surgeons' curved instruments is generally better than using any caustic. There is so much loose skin in the neighborhood that subsequent puckering need not be feared when a scar forms. Salicylate collodion is the safest solvent to employ for such warts as have a broad base and cannot be ligatured or "carved" out.

Wounds of the Eyelids.—For the general treatment of wounds the reader is referred to the chapter on Wounds, at page 295, but it is well to mention here the necessity of preserving every shred of a torn eyelid, and to warn him against cutting away rags. Experience of these accidents shows one that Nature performs her very best surgery in connection with the eyelids, utilizing the merest fragments of skin and making a good mend generally of what looks like a really desperate case.

Overflow of Tears.—Tear-stained faces are objectionable in all creatures, and many animals are thus disfigured. Defective lids cause but few of them. The almost certain cause is occlusion of the duct. In the inner corner of the eye is the so-called haw: a body composed partly of membrane with a cartilaginous thickening and whose office it is to sweep the eye of flies and other foreign bodies. Under it is the little canal down which the surplus tears find their way on to our pocket handkerchiefs when we pretend not to be affected by an emotional story. The other end is best observed in horses. If the nostril is opened by the finger and thumb it will be seen as a hole in the skin on the floor of the chamber. Pug dogs, bulldogs and others with snub noses are naturally more liable to get the passage blocked because there is an abrupt turn in it not met with in the long-faced varieties. By means of an elastic probe or by a syringe an obstruction is sometimes removed, but more often than not the stoppage is due to chronic catarrh of the lining membrane and consequent thickening and blocking up of the channel.

Worm in the Eye.—A filaria (F. immitis), the embryo of which is taken in water, gets into the eye of the horse or dog in some countries and has to be let out by puncture of the aqueous chamber. Such an operation will necessarily be entrusted to the skilled surgeon, who will puncture the chamber at the side and conduct the little stranger through the orifice. If done with proper aseptic precautions, very little inflammation follows, and the chamber refills quickly.

Dislocation of the Eyeball.—This dreadful accident sometimes happens to horses and cattle, and owing to the difficulty of control and need of immediate measures, generally results in amputation being unavoidable. In prominent-eyed dogs it has been frequently overcome successfully by reposing the globe with a minimum of force assisted by cocaine, and perhaps by the cutting of the outer corner of the lid. There is no time to send for professional aid when it happens, and the owner had better attempt it himself, by getting another person to hold the animal while with his thumbs he presses back the organ. It should then be protected by a bandage over a pad of lint, soaked in a simple antiseptic lotion, such as ten per cent. each of boracic acid and glycerine in water. Even if some damage is done to the sight it is better to have such eyes than "holes that eyes did once inhabit."

ANESTHESIA.

Veterinary surgery has made great progress since the more general adoption of chloroform and other anesthetics among its votaries. So comparatively easy and safe is it to administer these things that the intelligent amateur may take full advantage of them and even undertake operations which formerly were regarded with fear by the professional man.

Anesthesia may be local or general. An eye or a foot, a portion of a limb or a tumor on some part of the body may have to be operated upon, and this may be rendered insensitive to pain by substances locally applied, or it may be desirable to render the animal wholly unconscious, as for such an operation as castration, where a restricted area cannot be wholly anesthetized.

A number of new anesthetics have been lately introduced and as is usual with new things have been too favorably reported upon by a few enthusiasts. Some will no doubt survive and be found to possess advantages over the better known agents, and for particular cases, but for the general practitioner and for the amateur it is on the whole desirable to learn well the uses of things of established reputation and obtainable at every drug store of repute.

For local anesthesia cocaine answers better than anything else, but has its dangers. A toxic dose may be given hypodermically, but the reader is not likely to go far astray if he follows the directions here given. Cocaine in a ten per cent. solution of oil of cloves may be painted over a surface to be fired, and will generally render the skin insensitive in from seven to ten minutes; the effect lasting for about twenty-five minutes. For a lotion to the eye, a five to seven per cent. solution dropped into it will have the desired effect. Similar proportions may be painted on the gums for mouth operations, but the whole amount given should not exceed the dose given in the table of doses, which will be found at page 432. The latter remark applies also when it is desired to inject the drug under the skin, as, for instance, when desiring to prove a lameness in the foot we inject cocaine above it, or in the course of the nerves in the channels on either side of the cannon bone, or a painful operation has to be performed for poll evil or fistulous withers, or a tumor dissected out, and occupying considerable time. Ether has been employed a good deal, but there are serious objections to it. It leaves the tissues as freezing would do and this is not favorable to healing.

General Anesthesia.—If we wish to completely subdue an animal we usually resort to chloroform. With horses and cattle it is so safe a remedy that only those who have tried to kill by its influence really know how difficult it is. I have given a pound of chloroform to a horse and failed to kill him, and only once, while operating on hundreds of horses, have I found difficulty in restoring one to consciousness. If an animal is known to have a weak heart and general anesthesia is necessary, the precaution is taken of adding a portion of alcohol or of ether. Dogs are not such safe subjects for chloroform, and the administration of it should be stopped if the flank is observed to be jerky, and the patient becomes excited. Cats of the long-haired varieties do not take it so well as the common kinds.

Methods of Administration.—A horse or bullock should be first cast in hobbles or by ropes (see Methods of Control, at page 414). Assuming that the patient has been fasted for about twenty hours he will not be likely to be upset. No muzzle is necessary in the case of the horse. Both nostrils should be lubricated with vaseline, inside and out. A sponge is then filled with chloroform and lightly squeezed, that it may not run, then pushed into one nostril (the uppermost one when the animal is on the ground). The assistant holds this nostril to prevent the sponge being blown out, while with the other hand he regulates the inspiration and expiration of air. By compressing the free nostril while air is being inspired through the sponge, he gets its full advantage. At the same time he prevents inspiration through the other one by closing it, and relaxes his fingers to permit of expiration; only retaining the sponge with the other hand. Not many full inspirations through the sponge are needed to dull the senses, and in a few minutes the patient whinnies to unseen friends or "babbles of green fields," when it may be assumed that he is going under.

His rolling eyes and failing pulse need give the operator no cause for alarm; he had better not take any notice of these signs, but keep his eye on the flank, and when a jerky respiration is followed by what looks like cessation, remove his sponge for a moment or two and allow a couple of inspirations of fresh air. He will find this so rapidly restorative that it will give him nerve to pursue his work; putting on and taking off the anesthetic as may seem necessary if the operation is a prolonged one. When thc performance is completed he will remove the shackles and let the horse gradually regain consciousness; not asking him to get up but waiting quietly for the patient to remember where he is, and rise naturally. Some impatient operators throw a bucket of water over the animal's head or pour a little in his ear, and this startles him into proving that he is awake and able to rise to his feet, but he will progress in a drunken sort of way, unless allowed to stand for a few minutes while whisped and "chirruped" to, to assure him that all is well. I have unnerved hundreds of horses under chloroform, and felt so confident of their being all right that as many as three subjects have been on the ground at one time, coming to, as we say, while another has been under the knife, and if I have made a mistake it has been in hurrying them up in my desire to know if any accident has happened to the spine. The horse should be steadied by a man on either side when first gaining his feet, as he will most likely shake himself rather violently, forgetful of his intoxicated condition, and seem like falling over. Then his face may be sponged with cold water and his muzzle again anointed with vaseline. Appetite returns immediately, and some horses begin to eat the grass around them before they are sufficiently recovered to get on their feet. It is better that they should not eat anything for an hour or two, but be whisped dry in the stable and clothed. Lard, in my experience does not answer so well as vaseline; the few nasal discharges that have followed have always been after that substance, and not when vaseline was used. With a cow or sheep a muzzle of some sort is a necessity, but there is no need to purchase one for a single occasion, although more convenient than a nose-bag, which may be made to do very well.

Dogs and cats may be chloroformed by holding their faces in a wide-mouthed pickle bottle on the bottom of which some cotton wool soaked in the drug has been placed. In the same way, cockerels to be caponized may be rendered insensible.

The question is often asked "How much chloroform does a horse or a dog need?" It is one that can only be answered in general terms and for the reason that the subjects vary greatly. Something less than an ounce is generally enough for a horse, and about a quarter of that amount for a dog. Here again, we may say that a cunning old dog or wily cat that holds her breath and takes very short inspirations, when she can do so no longer, will be taking up time during which the volatile drug is evaporating. But, supposing all subjects behaved alike there would still be a great difference in the amount required for individuals. The quantity measured into the glass or poured upon the sponge then is no criterion, and the operator should judge entirely by the effects produced. The struggling animal or fowl becomes limp in one's hands and the head droops before the patient altogether collapses. This is the time to take away the bottle, while having it in readiness for further use. A mixture of equal parts chloroform, alcohol, and ether, is used for subjects with doubtful hearts, but it leaves them with a drunken headache and dribbling saliva from the mouth, which is very undesirable in cats; these animals sometimes being permanently nauseated and refusing food for days.

CHAPTER XIX

HEMORRHAGE, BLEEDING

Animals sometimes bleed to death for want of assistance that any person might give if possessed of a little knowledge such as Ambulance Societies impart to their classes.

Fatal results do not often occur because there is a natural remedy in the formation of clots, and the injured beast seeks solitude and remains quiet while this process is going on. Treatment should be based on observation of Nature's methods, and the student is asked to note a castrated animal such as a lamb from whose purse and dock arteries are spurting blood at the moment of his release. After a little time long clots hang dependent from the divided vessels and the dripping of blood gets less and less until the clots have formed plugs or stoppers which do not fall away until the vessels inside of the animal are safely closed. Lambs often sway before lying down and all creatures suffering from extensive hemorrhage either seek a recumbent posture or fall down, and such attitudes favor the weakened heart and the anemic brain; these organs presently recovering their functions when a clot has dammed the outflow of the life-blood. A fainting person should not be held up, but laid out; or it may be enough to press the individual's head down between his knees, and so retard the blood from leaving the brain. A divided artery spurts bright red blood synchronously with the heart's action. Opened veins pour out a slow continuous stream of darker colored blood. If a tourniquet can be placed between the wound and the heart, hemorrhage will be controlled. To stop a vein from bleeding the binding material is placed on the farther side of the wound, as venous blood is returning to the heart. Most accidents happen to the limbs or extremities, but bodily wounds present greater difficulties in the way of ligation. In the case of the latter, however, we generally have the advantage of flesh capable of being compressed by a variety of means. A pocket handkerchief and a stick will serve for a tourniquet when away from home, and in the case of a limb; or we may divest ourselves of a coat-lining or any other material in a case of emergency. Once the danger of fatal hemorrhage is over, the person in charge can look round him and consider what is best to be done next. The subject of bleeding should not be traveled beyond the first available building, or the shelter of a tree. In the case of flesh wounds where tourniquet or ligature is not available, attempts should be made to draw the edges together, with no matter what crude instruments, because clotting will be favored by any approximation of the lips.

A green skewer or two cut from the nearest bush may be passed through holes made in the skin by one's pocket-knife, and around these skewers any available material can be wound in figure of eight. The hairs pulled from tails and manes make strong binding, and if several are tied together may secure some portion of a garment used to staunch a wound. Scarf pins and brooches, hat pins and other things are often carried on the persons of individuals standing helplessly in front of a wounded animal, but their use in such cases does not occur to them. The means we have referred to are not ideal surgical methods. They carry much risk of septic infection; but "any port in a storm," and the earliest opportunity must be taken to disinfect a wound which should have been made aseptic at first, if the materials had been at hand, as they would be in the home. The surgeon would prepare everything to be used, sterilizing instruments and suturing materials, and seize an open vessel with bulldog forceps and make sure of it by putting on a ligature of antiseptically prepared silk or of soluble animal tissue, which would enable him to close a dangerous wound over the stuff before bringing the skin together. (See Wounds, at page 295.)

Internal Hemorrhage.—Bleeding internally is shown by sighing, trembling, hanging the head, cold extremities, and by the pallor of the mucous membranes and flickering pulse, when not affording more certain evidence of blood escaping from one or other of the natural outlets of the body (see Ruptured Liver, at page 126). Fatal hemorrhage inside may occur without any outward flow of blood, but the animal will be seen to be in great distress, and the owner will then ascertain for himself if the first mentioned symptoms are present.

Treatment.—A dose of brandy or other stimulant to sustain the heart's action and then a dram or more of gallic acid dissolved in water or in the spirit. Acetate of lead in twenty or thirty grain doses in solution in water is a remedy advised. The patient should be bandaged and clothed and saved from any excitement. Water should be given freely to drink, as it acts as a rapid restorative. Blood coming from the rectum may be assumed to be from the intestines and cold water with such astringents as alum and tannic acid will come in direct contact with the lesion.

Similarly an escape from the vagina, or urethral canal of the male, will be assigned to the kidneys or bladder, and cold effusions over the loins are calculated to arrest its flows. Cold water is also dashed over the loins and thrown against the belly when hemorrhage occurs after castration. Shock produced by buckets of cold water often act well, and this applies when the blood comes from the nostrils and is assigned to the lungs. (See Diseases of the Lungs, Hemoptysis, etc.) Plugging of the nostrils is referred to elsewhere, as a means of arresting bleeding.

There are a number of things with coagulating properties which can be applied to bleeding wounds with advantage, but the popular remedy of cobwebs is not one we advise, as they are invariably dirty and we should use every means to keep out dirt (see Wounds).

Tincture of iron, tannic and gallic acids, spirits of all kinds used as beverages, whites of eggs, and the hot iron applied to the open mouths of vessels. (See Firing, and reference to asses and mules when castrated, pp. 365, 371.) Persistent hemorrhage from a number of small vessels, or from one which cannot be taken up with forceps or tied, may generally be suppressed by bandages, one upon another. I have found these sufficient in such large vessels as the plantar arteries of the legs when they have been cut in mistake for the nerve.

CHAPTER XX

PARASITES, WORMS

Parasites are creatures that live upon others—upon them or in them, to be more accurate. Most of us are so familiar with types of men and women who have become parasitic, that no further explanation of the word is necessary here.

Those creatures which live upon the surface of others, as lice, fleas, ringworm, mange mites, etc., are called ectozoa, while the inside dwellers are classed as entozoa. Outside and inside passengers would have been sufficiently descriptive, if we had added, "with free meals to destination." It is not enough for them that they get bed and board and a free run of the establishment, but individually or collectively they seek to injure their hosts, either of malice prepense, as lawyers have it, or by such increase of numbers and consequent needs that, like the Israelites, they finally "spoil the Egyptians," before taking their departure. Like the chosen people again they are "out for trouble" and will despoil new hosts and possess themselves of the land. Our simile may be further pressed because many of them are not the enemies of one species but pass a number of unprofitable lives in a variety of hosts and enjoy what most nearly approaches to reincarnations until the final state of Nirvana is attained.

The term host and guest will be found in the language of all helminthologists, though some take rather an indulgent view of the conduct of guests which in small numbers do no great damage or live exclusively upon the gathered food in the alimentary canal and not upon that which has been almost digested or upon the living tissues of the bearer. For such, the kindlier name of fellow boarders has been adopted. Most of us with practical experience of the injury inflicted on farm stock regard them as Westerners used to view "the noble savage," namely, as "an unmitigated cuss," or "pison, wherever found." However, there are apologies to be found for every form of evil, and a great lady novelist (diving into Egyptian papyri apparently) discovered grounds for sympathy with the Devil himself, as may be gathered from a perusal of "The Sorrows of Satan."

In many situations the success or failure of the stock breeder will depend upon the number and species of parasites, and his power of combating them. I wish the foregoing sentence could be branded deep on every farmer's door, because I have proved it again and again and do not merely echo the sayings of wiser men. If the gift of public speaking had been mine, I would have addressed farmers' clubs everywhere on this subject, and by earnest exhortation made many believe in the importance of perpetual warfare on parasites, as upon weeds. Some of the fertilizers are also destroyers of worms in their intermediate state, and this fact is but one more proof that good farming pays better than slovenly and unintelligent treatment of the land. It is not proposed in this chapter to enter into an elaborate classification of parasites and their anatomical details, such as the professional reader must needs assimilate in order to pass examinations, but to take a glance at the chief groups and the methods of dealing with them. We will take the tape worms first because their cycle of life has been clearly demonstrated, and the half-convinced reader will be wholly converted to the importance of preventive measures.

Tapeworms, Cestoda Taeniae.—These are found in man and beast, bird and fish, throughout all known regions of the world. Some are peculiar to a species of animal; others infest a variety, including man. Some 150 varieties have been catalogued, and the life cycle of the most important is proved. There is first the egg, then the cyst or hydatid, and lastly the mature worm. A sheep or other animal may be entertaining mature tapeworms in his intestines, and the hydatid form in his brain at the same time. The mature worm will be producing eggs which pass out upon the grass to be swallowed by another animal, sheep, dog, rabbit, or other creature, according to the particular worm and its preference for certain hosts; or shall we say the facilities offered for these count for much but not all a parasite's conduct. If we state the history of a single egg we have the plan or cycle of tapeworm life before us, and we will therefore suppose a dog enjoying a Sunday ramble with his city master, and passing the eggs of tapeworm upon Farmer Jones' fields. An egg upon a blade of glass is swallowed by a sheep. In the stomach, its outer envelope is dissolved. An embryo is released. This creature has a mouth capable of cutting through the membrane lining the stomach or intestine, which enables it to get into the circulating blood. It is also provided with six hooks which serve the purpose of anchors or grappling irons. It has the instinct to know when and where to cast anchor. The commonest of tapeworms (the Cœnurus cerebralis) will choose the brain of the sheep, and his presence will provoke a limited amount of irritation. Like an embryo of a mammal in the womb he becomes surrounded by a membrane, and inside of this grows and prospers; the fluid enclosed in the sac or cyst or hydatid, as it is severally called, increasing in quantity, while on its inner aspect or lining membrane, the heads of future tapeworms are formed. In this host (the sheep) no further development takes place, and our comparison with the fetus in the womb ends. The pressure upon the brain substance caused by the enlarging cyst induces the giddiness or spinning round and falling to the ground known as gid or turn-sick, and by a variety of other names in different countries. Not all sheep are rendered giddy by hydatids, as some of them form in the upper portions of the cerebrum, and gradual accommodation is acquired (the upper layers of the brain can be cut away without causing death if the operation is carefully performed and all concussion avoided). A much smaller cyst, nearer to the base of the brain, from whence the nerves originate, will interfere more seriously with the functions of the organ, and pressure upon the little brain at the back (cerebellum) will induce paralysis or fits, because its special function is the co-ordination of the voluntary muscles.

In old ewes, these cysts are found to have undergone changes, begun by shrinkage and ended by calcification or conversion into a chalky substance. In the ordinary course of things, the sheep is killed, and the butcher finds the cyst in the brain, and throws it out as unfit for sale. Here comes the dog's opportunity. He picks it up, and the liberated heads fasten on to his intestine and new segments quickly grow until each becomes a new center of egg production; some thirty thousand being the estimate for a single one. We have now traced the life cycle from the egg to the egg again.

There are many so-called intermediary bearers in whom the cysts of tapeworm reside while waiting their conveyance to a new environment. Some find their way into fish: one variety into the proboscis of the common house fly, who is caught by the cat and in her develops tapeworm. Dogs and cats fed on fish entrails are infested with a variety of tapeworm known as bothriocephali, the cysts of these worms being often seen hanging as little bladders to the intestine of fish, when the cook is cleaning them. Whatever the species, the same cycle of life goes on. The "fifth quarter" of hares and rabbits thrown to sporting dogs are the chief cause of tapeworms in those animals. Human subjects get them from eating green salads upon which small molluscs containing tapeworm cysts have eluded the perfunctory washings accorded to such food.

Treatment.—The reader who has considered the foregoing remarks will have come to the conclusion that expelling worms is beginning at the wrong end of the business, but we are often compelled to do this. Dogs should be physicked at least twice a year because of the danger to sheep. If fasted for twenty-four hours, tapeworm will generally come away in response to a dose of areca nut, freshly ground, and given in the proportion of two grains to each estimated pound weight of the dog. The finely ground powder of the drug store is often inert, and the nuts should be grated. It should be said, however, that all worm remedies are uncertain in action, and the drug that fails at one time will often succeed at another. It would seem as if worms were like other creatures living in a fluid medium, and shared the peculiarity of fish, biting freely at an indifferent bait on occasions, and refusing the most tempting morsels at others. When areca has failed, or a dog vomits remedies, he may be given a mixture of drugs in a gelatine capsule, consisting of aloes twenty to one hundred grains, areca, forty; kamala, twenty; and spirit of turpentine, ten to forty drops, according to the size of the animal. The old stagers, grown thick and yellow in their fancied security, are generally routed by such a compound, and the final invitation to take their departure may be given from the other end, by sending into the rectum the same dose of turpentine mixed with warm olive oil and conveyed by means of a glycerine syringe. The writer has succeeded by these means when all else has failed.

Horses, cattle, and adult sheep have some very small and some short and particularly wide tapeworms peculiar to themselves. An aloetic ball, and a week later an ounce or two of turpentine, in a pint of linseed oil, is usually enough to dislodge them.

It is with sheep of the first year that we have most trouble. They acquire them often before being weaned, and suffer severely in the autumn. The remedies that act so well in the case of other animals prove disappointing with sheep. The large volume of ingesta must ever be a difficulty with ruminants, as they are never really empty, and doses need to be so large as to entail risk if a considerable proportion is not taken up by the food and wasted. A course of sulphate of iron, or common salt, and gentian (see Table of Doses, at page 432) makes numbers of worms sick, and results in their expulsion, besides which, the lamb profits by the tonic properties of the iron and gentian, and they are very cheap remedies capable of wholesale use by mixing with trough food, and entailing very little labor. Turpentine given in linseed oil after a fast of twenty hours is also a remedy of value, but nothing has hitherto equalled arsenic. One to two grains, given with a teaspoonful of sulphur, on a period of fasting, and repeated in ten to fifteen days, has brought excellent results. The best combination is that of arsenic, dried sulphate of iron (10 grains) and sulphur, in a tablet compressed, and given as a pill in the morning.

Prevention.—Keeping down tapeworm in dogs has already been mentioned. Destroy all intermediate bearers where possible. Rabbits should not be allowed to multiply and deposit upon the pasture. The reader is asked here to take a wider view than the prevention of tapeworm only, and to remember that many other parasites have an intermediate life in slugs and other creatures which live in the ditches and upon pasture plants, and deal out salt, soot, and lime, with a liberal hand, in the hope of destroying many enemies at the same time. The slugs and snails which harbor flukes and husk worms, and perhaps the red worms of horses (Strongyles) can none of them survive a one per cent solution of common salt.

Round Worms and Thread Worms.—The common round worms known as ascarides are chiefly prejudicial to the young. Each species of domesticated animal has its own ascaris but the manner of infestation has not been ascertained. It is assumed with very good reason that the eggs of most of them pass out and undergo changes like the tapeworm and the fluke, and that for the most part the food is the medium of infection, but this theory is rather upset by the fact that we find puppies on the teat with well developed ascarides which must have been growing for some time. They may have, of course, been taken in embryonic form while adhering to the mother's teats.

The large Ascaris megalocephala of the horse, the Ascaris suis, of the pig, and mystax of the dog and cat, dwell chiefly in the small intestine, but wander into the stomach, and in pups and cats provoke vomiting and their own expulsion, not infrequently. They are all great robbers, and staring coat, hidebound, or loss of condition, are common accompaniments of round worms. The loss on pigs alone must be enormous, for these animals become early infested with the Ascaris suis, and a pint or more is no unusual quantity to be found in one animal.

Treatment.—The large round worm of the horse is the most easily expelled. An aloetic ball, with a dram of santonine, or given alone after a day of mashes (see Physicking, at page 363) will almost certainly have the desired effect. One or two ounces of spirit of turpentine, in a pint of linseed oil, is also good for the expulsion of round worms.

Swine should be fasted and given santonine in doses of five to twenty grains, or more for big hogs: the dose being administered in a handful of moist meal, and followed by warm castor and linseed oil in a small feed of middlings or other food. Aloes kill these worms as they do in horses, but the difficulty of administration makes most people prefer remedies that will not be rejected in food by a hungry pig.

The ascaris of the horse must not be confounded with the common whipworm (Oxyuris curvula) which is a so-called dung feeder inhabiting the large bowel and to be found in great numbers in the rectum: a fact to be remembered in the war that must be waged against this species. They would seem to breed within the victim or host and can never be wholly eradicated, although their numbers may be so reduced as to make them practically harmless. By back-raking or emptying the rectum by means of a greased hand. many of these worms will be carried out. At the same time, the gut should receive a quart or two of infusion of quassia, or an ounce of carbolic acid, in a quart of linseed oil: or an infusion of an ounce of tobacco, in a quart of boiling water; introduced when tepid. Weak vinegar for a change may be used, as may solution of table salt, and an occasional half ounce of mercurial ointment. By ringing the changes, and an occasional purge, vast numbers of worms can be expelled, and the subject of them will thrive fairly well.

Strongyles.—If we except the ravages of tapeworm in lambs it may be said that the little red strongyles (Tetracanthi) do more damage than any other parasites, because they lead often to the death of valuable young horse stock, and make the land "sick to horses," as it is said. They are about half an inch in length, and so thin as to be often unnoticed, until they have done irreparable damage and the owner has been advised to carefully examine all the feces passed. Then probably he finds them in overwhelming numbers, but not in every evacuation, or day by day; and this should be remembered in seeking the cause of colts wasting away while well fed. The dung should be frequently examined. Many old pastures in Great Britain, where Shire horses have been reared successfully, have had to be abandoned on account of these small worms.

Treatment.—Many remedies have been tried but no really reliable one has been hitherto discovered. Much fuss was made of thymol at one time, but this was in a measure due to the romance of its introduction by a French doctor who had been a prisoner of King Theodore's, and seen its effects upon Abyssinians infested by worms through their habit of eating uncooked flesh—a habit, by the way, that most of us heard of in a famous nursery rhyme ("The Abyssinian Sam; eating the live bull").

Fifteen grains dissolved in whiskey or gin and diluted with milk has sometimes had good effects, but larger ones have since been given with safety. Turpentine and linseed oil, as advised for other worms, has also succeeded at times, and where the young stock is not too much weakened to bear a purge, a ball of aloes will clear away a goodly number. However, these are not cures, nor moderately reliable remedies; nor is there one. Probably the best treatment on the whole is the daily administration of iron, quinine, salt and gentian. (See Table of Doses.) We have found that with these tonics and blood builders, mixed with nutritious food, colts will win the long battle, although debilitated and pot-bellied, and often failing in growth; at least for a time.

Older horses are not so desired by these worms.

The Strongylus armatus, or armed strongyle, cuts his way through the bodily tissues, and for a home prefers the junction of an artery, where he sets up inflammatory processes and sometimes causes the death of his host. Quite a number of the asses dissected at veterinary schools are found to have such nests of worms at the junction of the hepatic artery, and others not far distant from the intestines. Living at times in the intestinal canal, they pierce the wall and wander where they list. They cannot of course be got at by any remedies while in the blood-vessels, as any drug that would destroy them would kill their hosts. They are called palisade worms, from their shape, and are by this distinguished from the whip-worms previously mentioned, besides which, the dark, dung-filled canal of the latter, and its tapering tail, separates it from all other intestinal worms. When these dangerous worms are identified, the treatment advised for other round worms should be energetically carried out, before they have set up nests in the blood-vessels. Some mysterious lamenesses in horses are found after death to have been caused by blocking of the vessels with the S. armatus, and the morbid products resulting from his presence. They are great breeders, too ("the vilest things do fastest propagate"), and remain *in coitu* until the female bursts through being incapable of containing more eggs.

Husk, Hask, Hoose, Verminous Bronchitis.—This disease in calves and lambs is caused by S. filaria and micrurus gaining access to the smaller bronchi. There is a spring and autumn hatch and it is during the latter season when heavy dews are most observed that the subjects suffer most. It may be that the first crop is not less abundant, but the sun rises earlier and the morning mists are sooner dispelled. The worms are taken in by animals while grazing. The soft bearers retire when moisture leaves the foliage and seek shade when the sun gains power. Advantage is taken of this on relatively small holdings and yearlings are yarded at night and not allowed out until the orb of day has well risen. Husk on the prairie or the back lands cannot be dealt with as in fenced lands and where buildings and yards afford greater control, but in the latter the disease can be practically eradicated by persistently dressing the land in spring and autumn in showery weather with salt, soot, and lime: as much as half a ton to the acre of rough broken salt being in some cases employed, and half that amount of soot. Lime is a destroyer if recently slacked, but one would not advise it for a chalky or limestone soil, although for some others it would have a manurial as well as antiparasitic value.

The symptoms are generally known, the cough being a soft or husking one, with more or less dribbling of saliva and nasal mucus when bad enough to cause distress. Young animals lose flesh and condition rapidly when many worms are present, and their sleep is disturbed and rumination interrupted.

Treatment.—The custom of pouring drenches down the nostrils of calves and into the ears of pigs when similarly infected by another thread worm which gives rise to cough in those animals is altogether wrong and fails of its purpose. Only volatile remedies can reach the worms when given by the mouth. Turpentine and tincture of asafetida are exhaled more or less in the breath, and undoubtedly help to keep the worms in check, if given after a night's fasting in doses of one to two drams to lambs, and two to four drams to yearling cattle, in two to six ounces of linseed oil. There are many advertised nostra for husk, but none of them are better while costing much more than turpentine and linseed oil.

With experience of thousands of cases the writer most strongly recommends the direct method of introducing the vermifuge into the bronchial tubes by injection through the windpipe. This method was first tried by an Englishman named Penhale and it is doubtful if any formula is better than that used by him and consisting of oil of turpentine, 2 drams; pure carbolic acid, 20 drops; chloroform, 30 drops. This is for one dose for a yearling bullock: the quantity for a lamb varying according to size and age, but about half the above will be an average one. The one objection to this mixture is its rapidity of separation, whereby a careless person will fail to send it in properly suspended. For such, a safer plan is to inject rather more carbolic acid, mixed with olive oil to the amount of half an ounce: then no fear of irritation from the separated acid need be feared. The calf or lamb should be held with a straight neck, and chin a little elevated, while the operator holds his syringe ready filled and selects the middle of the windpipe where it is least covered by flesh, and with finger and thumb tightens the skin over the seat of puncture. The needle is then pushed through regardless of the annular rings in the trachea, but with care to avoid sticking it into the opposite side. A rather downward direction should be aimed at, and the contents of the syringe should be slowly but continuously ejected. Some excitement and coughing follows, but I have seen calves recover when so far *in extremis* that I would not operate without the express wish of the owner and exoneration from all blame in the event of the subject giving up the ghost. Hypodermic syringes are made specially strong for this purpose, and two needles of varying size sent out with them. Every stock owner should have one, and put it away carefully cleaned and oiled, and it may be made good use of on other occasions, especially by those who are prepared to adopt hypodermic medication as up-to-date practitioners do. (See chapter on Medicines, at page 424.) A week should elapse before injecting a second time for husk. To enable the young animals to combat the debilitating effects of the worms, they should be given good food, damped and mixed with salt, and iron and gentian. (See Dose Table, at page 432.)

Flukes. Liver Rot Worms.—There are quite a number of flukes and they are found in many other animals besides the sheep. The arctic fox is one of them, and bears, antelopes, and other wild animals. Cattle not infrequently act as hosts, but they seldom haunt these animals in such numbers as to cause serious disturbance to health. We are chiefly concerned with the Fasciola hepatica of the sheep, which is the cause of the rot, bane, coth or fluke disease, as it is variously named. In appearance the fluke is like a sole, and its final habitat is in the ducts or tubes of the liver: not in its substance. Here it gives rise to irritation, and by its waste material interrupts the flow of bile and eventually causes general dropsy and wasting. The stimulation at first caused by flukes increases the activity of the liver and sheep thrive. This is an important matter to bear in mind, as an infected flock may be killed off during the early stage without very serious loss. It always pays to kill a subject or two if in doubt. If in two or more sheep a number of flukes are found and the flock has been kept under the same conditions, it may be assumed that the remainder are similarly infested and that it will not pay to keep them. This is the more desirable because no curative treatment is hopeful. We cannot get at them in their safe retreat. We should kill the *sheep*, with a remedy strong enough to affect them through the medium of the circulation.

It is true that sheep put on salt marshes and fed with salt and iron and gentian put up a better fight against the disease, but such deterrents are not cures: they only serve to check the prosperity of the garrison and make their food less palatable. More important than treatment is a knowledge of the method by which flukes are propagated, because this enables us to destroy them at the source. The egg passing out upon the ground may be desiccated by the heat and dryness of the atmosphere, but vitality is very considerable, even under tropical conditions. Hills are less likely to retain flukes than water meadows and levels, first because they are dryer, and secondly because the eggs get carried away by rain. In circumstances favorable to the egg (warm pools and ditches, for instance), hatching quickly takes place; the embryo is endowed with ciliæ or hairlike processes and of great motile power, to enable it to find a water snail into whose body it projects itself by means of a boring apparatus with which it is provided. As a sporocyst it develops rediæ which find their way out of the cyst and attach themselves to the liver of the host or intermediate bearer. A redia becomes the parent of a dozen to twenty cercariæ or flukes with tails which enable them to swim around until they cast anchor upon a suitable blade of grass and cast off their tails. Here the tadpole-like creature assumes the appearance of cyst, and retains his envelope until swallowed by a sheep, when his covering is digested and he ascends the liver ducts of his ultimate host, to mature in the same way as his predecessors.

Prevention.—The one per cent. solution of salt previously mentioned will kill the snails which contain the cercariæ. Rough salt was recommended for the destruction of husk worms, and the little red strongyles of horses: probably also the ascarides. It will pay its cost in the prevention of rot alone, but seeing how many parasites have intermediate lives in the soil or in the bodies of soft molluscs, it would seem unnecessary to urge upon stock owners the desirability of freely dressing the land with broken rock salt or the more refined article from the factory. Land should be drained, and, above all, ditches and marshy patches should be cleaned annually, and lime, soot, or salt, or all three, mixed with the thrown out stuff, while letting the sun assist in desiccating all sorts of " cusses."

Bots.—Most horsemen are familiar with the grubs which pass out of their steeds in the height of summer, and condone their presence because an early writer of credit and wide insight made the mistake of exonerating them from doing any harm. They do much harm, and occasionally cause death of the host. There are two principal kinds of bots in horses. The commonest (Œstrus equi) is the grub of the bot fly which lays its eggs upon the shoulders, knees, flanks and other parts most easily licked by the horse. They are yellow elongated bodies which adhere strongly to the hairs. When carried into the stomach they develop into soft grubs (bots) which attach themselves to its walls. With their heads buried in the mucous membrane it is not surprising that they resist remedies that would certainly kill them if swimming free in the stomach.

Like all other creatures they know the time and the season, and quit when it suits them, which is in the height of summer. Falling out upon the ground, or thrown upon the manure heap by the groom who does not think to kill them when seen, they undergo the chrysalis stage, and presently hatch out as male and female bot flies. The male is an innocent creature, save for the fact that there would be no more females but for his one purpose in life. It is his mate of course that gives all the trouble.

Treatment.—All sorts of remedies have been tried, and each obtained credit when administered at about the time when the grubs would leave of their own accord. For the reason given above they are seldom routed, although a few come away after disturbance of the stomach such as a physic ball will cause, or an attack of the gripes. The most effective killer is that of bisulphide of carbon in a gelatine capsule, some 70 to 100 drops being given on an empty stomach, and followed by a ball of aloes.

Fundamental Bots (Œstrus hæmorrhoidalis) are found clinging to the lining of the last gut (rectum). They are rather smaller and darker in color than stomach bots. The female fly deposits them during the short time that the membrane is extruded in the act of defecation. The same opportunity is afforded the groom of picking them off. A spoonful of mercurial ointment introduced when the gut is empty, is another means of destroying them.

Ox Warbles.—These grubs resemble the bots of horses, but are much larger, and their home is under the skin of the back. Until the Irish Board of Agriculture stated otherwise, it was always supposed that the gadfly, from which bullocks flee in wild terror, tearing round fields with lowered heads and uplifted tails, deposited her eggs by means of a spear-like armature specially designed for the purpose. It is difficult to imagine any other way of the grubs getting there, and certainly there is no more direct method, but the discovery of wandering and often immature grubs in different parts of the body has led to the suggestion that the eggs are sent through the skin of the legs and other parts and that the warbles only result when the grubs—soft-nosed and unarmored—have made their way through two to four feet of tissue, much of which is solid flesh. Another reason for putting forward this idea was the proved inutility of smears of tar and other objectionable substances along the region of the back where warbles are most often met with. This information is drawn from official sources, and is not an Irish "bull." The present writer finds it difficult to reconcile the behavior of a bunch of cattle pursued by a gadfly with the new theory. Why don't they behave in the placid manner of the horse when the bot fly is depositing her eggs?

Treatment.—When the warble or tumor has sufficiently developed, the most sure cure is to slightly enlarge with a penknife and with two strong thumbs to squeeze out the grub—and stamp him out flat, don't forget. They can be destroyed in their nest by rubbing in mercurial ointment. If everyone would kill the grubs there would be no gadflies, and millions of dollars would be annually saved to the world in damage now done to hides.

Sheep Bots. Œstrus Ovis.—The sheep bot attacks the nostrils and the fly deposits her eggs in such a manner that the grubs shall find a home in the air passages and sinuses of the skull. They sometimes wander into distant regions and are not infrequently found within the cranium, and in the bronchial tubes, but these are gone astray, and can never hope for the higher life of the winged insect. If not disturbed by catarrhal affections they remain until the following summer, when they are blown out and undergo the same transformations as the horse bot and the ox warble.

Treatment.—There is no effective method of dislodging the sheep bot when he has gone into winter quarters. When the time of year comes for the fly to deposit her eggs, and sheep are observed bunching together with their heads all turned inwards to avoid her attentions, the animals should have their muzzles smeared with tar or fish oil. A simple plan of self-dressing is to place food in a trough with a wooden cover in which a number of augur holes have been made, and thickly coated with the intended protective substance. The holes must be just big enough to permit the feeders to get the bait.

CHAPTER XXI

GENERAL THERAPEUTIC MEASURES

Antiseptics, Disinfectants.—Anything which prevents the entrance of deleterious organisms into an animal body—notably through wounds and abrasions—is called an antiseptic. Any substance which will destroy them after they have entered is known as a disinfectant. A still wider significance is given to the foregoing terms, besides the surgical interpretation just used. A sheet saturated with a disinfectant and suspended between a beast suffering from infectious disease and his healthy companions is an antiseptic precaution. A poisoned or septic wound, irrigated with a germ destroyer, is disinfected. Body evacuations are disinfected, and the drains through which diseased excreta are passed. Buildings, and land itself may be infected, as with the germs of anthrax, tetanus, and joint ill, and any treatment that will destroy these germs is disinfection. A thing rendered sterile, as a properly boiled surgical instrument, is said to be aseptic or aseptically prepared.

The importance of antisepsis and of disinfection was demonstrated by Lord Lister and others in the last century, since when the death rate has fallen in all civilized countries, and abdominal and other dangerous operations have become comparatively safe. The animal doctor has not been behind in adopting all that is best in antiseptic surgery, and in some respects his uneducated predecessors had anticipated Lister and employed such valuable germ fences as the green castrator's ointment without knowing in what way it preserved their subjects from "poisoned" wounds, as they called them. They *were* "poisoned," but the observers, who only "saw through a glass darkly," could not see the minute organisms which were to be discovered later by the microscopist, who could see through a glass *brightly* illumined by a mirror, and aided by stains and a whole scientific technique. Such operations as spaying mares and removing calculi from the bladder and bowels have only been made worth undertaking since antisepsis was understood and acted upon by veterinary surgeons. In this connection it may be possible to remove a stumbling block from the path of the beginner who has seen pigs spayed by men who could scarcely write their own names and who had no need of antiseptics. The many generations of pigs bred in filthy surroundings has led to the survival of such as are comparatively immune to dirt diseases. If the castrated lamb or colt were to repose on the floor of the dirty pig stye, his chances of infection would be very great. The subject of immunity is one of degree. In pre-Listerian days, when men's legs were cut off without chloroform, and in the absence of disinfectants, in a ward teeming with pathogenic organisms, they did not all die of "hospital gangrene" or septic poisoning of the wounds, but these aids to surgery have come as a boon and a blessing whereby a vastly larger number of men and other animals specially susceptible can now be saved. The use of antiseptics is frequently advised in this work in connection with wounds, with parturition, navel ill, and in respect of a variety of discharges. There is a wide choice of disinfectants, and all have merit. Some are more suitable than others for internal use: as in uterine injections, and are specially named in that section of the book dealing with parturient difficulties.

Disinfection of Buildings.—To do this efficiently is often beyond the powers of the odd man generally deputed for the work. Disease germs are many of them possessed of great vitality and will lurk in crevices and odd corners in such a manner that they are never reached by liquids. Old frame houses, and sheds with faggot roofs, felt, straw, thatch, etc., can only be effectually dealt with by aerial disinfectants. It may be that only mangers and fittings with which discharges have come into direct contact need disinfection: or the malady may be one which can be conveyed by the medium of the atmosphere. The disinfectant will therefore be chosen with some regard to the cause of infection. A brick or stone building can be disinfected by any of the convenient popular preparations such as Jeye's fluid and Pearson's, and as directed on the labels. Carbolic acid is sufficiently miscible with *boiling* water to be used as a five per cent. solution, with which to syringe or spray the inside of roof; the walls, floors, and fittings; but whatever agent is chosen, it should be remembered that every article in the building should be subjected to its influence, or an old brush or sack may be the means of reinfection. If lime wash is chosen, the carbolic acid should be used at double strength. The whitewash affords the owner the opportunity of ascertaining whether any corners have escaped attention; otherwise it is rather apt to deceive us by the bright and cleanly look it gives to a stable.

Aerial disinfection is the most satisfactory, provided the building is made nearly air-tight. All chimneys, ventilators, and drain holes must be stopped, and no old hen sitting under a corner, or cat with kittens must be forgotten, before leaving the place. Fifty ounces of sulphur should be burned for every thousand feet of air space. The powdered article known as flowers of sulphur should be soaked in methylated spirit, and placed in an old can and set light to: then it is time for the attendant to clear out, and finish up by ensuring the proper closure of the door, which may need some outside provision in the way of sacking or stuffing with hay. A day and night should intervene before opening the door. By that time the sulphurous acid gas will have done its work.

Chlorinated lime is an old-fashioned and excellent disinfectant and may be spread on plates or mixed with water. Chlorine gas is a very powerful aerial disinfectant, but a little more expensive than sulphurous acid made by burning sulphur as above directed. To produce chlorine gas, four parts by weight of hydrochloric acid should be mixed with one part of black oxide of manganese, and a methylated spirit lamp placed under the container, and lighted. The operator must make his escape quickly as the chlorine is very distressing to the breathing organs, in however small quantity. As infection is conveyed in many different ways, a variety of methods are necessary to prevent it or destroy the virus. It may be carried in the air, in skins of animals and garments of men, in forage, and litter. The last recorded outbreak of foot and mouth disease in Scotland was traced to imported hay from Holland. Clothes may be baked or boiled according to the material: a high temperature being less destructive to cotton and most fabrics than chemicals of any kind belonging to the most efficient group of germ destroyers.

Disposal of Dead Animals.—There is abundance of evidence to prove that superficial burial of diseased bodies has led to infection of the living. Anthrax and quarter-ill subjects, if buried at all, should have not less than six feet of earth on top of them, to prevent the possibility of germ production from spores needing oxygen in which to grow. There is no treatment of the cadaver equal to the most ancient one of fire, but it is laborious where the bodies of large animals are concerned. The plan adopted by the military veterinarians in India is a good one, and is thus described by Gen. Fred Smith in his work on Veterinary Hygiene: "I use a trench, dug in the form of a cross, about three feet deep in the center, and gradually becoming shallower as it reaches the surface of the soil; it is seven feet long each way, by three feet wide, and the earth taken out of the trench is thrown in the right angles formed by it; on this earth the wood is placed. If two pieces of stout iron can be obtained to rest the wood on, so much the better. A layer of big wood comes first, then the trunk, which has had all the limbs and viscera removed: next, more wood, and lastly the viscera, also covered with wood. The pile is then set fire to, and the body of a horse can in this way be readily consumed in five or six hours. The object of the cross-shaped trench is to ensure a draught whichever way the wind may be blowing. The ashes are thrown into the trench and the place filled in. If the body is placed whole upon the fire, it will take about twelve hours to consume." (See page 14.) General Smith wrote this while in South Africa, with a previous ten years' experience in India, but we have to remember that in many States it is now an offence against the law to cut the skin of a carcass dead of anthrax, and we may find it necessary to burn the body whole: allowing the additional time he mentions. See Wounds, Tetanus, etc.

Methods of Control.—Whether for the purpose of medication or surgical operation, the animal doctor is met with the difficulty of controlling patients which cannot be expected to understand such interference, or willingly submit to pain, but wit is greater than strength or agility, and in a variety of ways we overcome the resistance of the huge elephant and the tiny lap dog. We make the nervous horse and the morose bull contribute to their own downfall, and the cat entangle herself by biting inanimate objects.

The methods of the cowboy belong rather to the important department of breaking and training, and animals have generally been submitted to these processes before their medication is attempted or the majority of operations have to be performed. Castration is of course excepted, but even in this matter a colt should have had some sort of preliminary handling or he will be sweated and pumped out in the preliminary fight for freedom, which is a bad condition to be in when any serious operation is about to be performed (see Castration, at page 368).

The twitch is a useful and much abused instrument whereby a horse is made to submit to minor operations on account of the pain caused by the compression of the plexus of nerves in the lip; pain which is increased by any effort to free himself. It should never be applied to the lower lip, as cases of paralysis have followed its use. Only with very obstreperous animals should it be applied to the ear, and then for but a short time, or the circulation is interfered with to an extent that leaves subsequent blemish. The tongue should never be twitched. Many grievous injuries have come under the writer's notice as a result of this barbarous practice.

A plain Manila wagon rope in the hands of a man who knows how to use it will serve many purposes, and among them the casting of horses, without hobbles or other aids. Mr. Galvayne, and some of his pupils, can cast a horse single-handed by following his methods, but they do not lend themselves to description, and no one should attempt the task without actual demonstration on living subjects. For general purposes we may use the old castrator's plan, provided we have enough men. The two ends of the rope are placed together. The loop is made to serve as a large collar, by making a simple knot. This is passed over the head, and the knot allowed to rest in the neighborhood of the wither. An end is then passed outside the foreleg and between the hind ones, brought round, above the hocks: passed inside of itself and carried under the collar or portion of rope first placed on the animal. Exactly the same thing is done on the other side. The loops thus made above the hocks are quietly lowered into the heel, and all is ready. The men who are to pull down the horse or ox run in a backward direction, whereby they obtain most power. The most reliable person is detailed to take charge of the head, and this he secures as soon as the animal falls, and while the next most experienced hand draws the legs together and secures them by half hitches above the hind feet. The fore legs are thus left free, and for many purposes may be so left, but for additional safety or for operation upon either of them, may be easily secured by a halter or odd end of rope. For castration or for hernia this system of roping is preferable to the more costly hobbles which are so useful where a limb has to be taken out and replaced and the patient turned on his other side. Firing and unnerving are best conducted by the aid of leather hobbles with a metal ring through which a rope attached to one of the front ones affords a fixed point.

Broken horses are often restrained by comparatively simple means against which a wild one would fight successfully. A stirrup leather round the pastern and above the knee, with the assistance of a twitch, will be enough for operations on the poll, the withers, and most parts of the trunk. See Poll Evil, Fistulous Withers, Quittor, and Castration.

Throwing cattle requires more attention to the loops of hobbles round the pasterns, as they more easily slip over, and cotton rope hobbles or a rope loop such as sailors call a strop is preferable to the solid leather article. Much care is necessary with the horned breeds, and a dunghill or very deep straw bed is generally chosen to reduce the risk of broken horns. It is perhaps not generally known that the stubbornness of a bull or big ox can often be utilized to perform an operation which he will rather submit to than yield to what he sees to be your wish. I have castrated many bulls standing when they have proved too perverse to get them to an appointed rendezvous. While someone engages their attention at the head, and in an angle between two walls for preference, where they cannot go forward, the majority will merely crouch when the scrotum is seized, and the testicles let out by successive bold incisions. An operation on a limb can often be performed by tickling the opposite one with a feather, or pretending to do something to it. The use of a blinder prevents an animal from measuring off a kick, it is true, but some will let fly in all directions when unable to see, and not try to kick if they observe one standing, as he ought to do, outside the danger zone.

It is an axiom that fear of the unknown makes us timorous, and those who have cast and operated on animals under all sorts of conditions have very little fear of getting hurt. As a matter of fact, all animals are more concerned to escape pain than to retaliate. Such simple operations as giving an enema place the operator in a position of danger. For any performance in rear of an animal and while on its feet, we may use the side line, which is a rope employed in the manner already described for casting, but so used as to bring the leg forward which could otherwise be employed to kick with. In a stall, as ordinarily constructed, one can generally do without ropes, by having the beast pushed over to the side, while the operator stands just round the corner, protected by the post. The mere holding up of a fore foot makes it difficult to kick without putting that foot down, but the man at the tail end need have confidence in his assistant and a quick eye to know when to get out of the way. There are some " cow kickers " who can plant a blow in your stomach or break your leg in a flash, without losing their balance although having a foot strapped up, and it is not advisable for beginners to run any unnecessary risk. The side line is easily applied, and any rope will do.

There are many other ways of controlling horses suitable for particular purposes, but those already mentioned are sufficient for veterinary work and had better be well learned than added to.

The cradle is used to restrain horses from blistering their muzzles or interfering with appliances. (See Blistering and Firing, at page 365.) Controlling to give medicine is considered under the heading of Administering Medicines, at page 425.

Of all methods of control we would commend anesthesia, local or general (see page 390). These are worthy of the humane man's careful consideration. They are inexpensive, safer for both man and beast, patient and operator.

Slings are as often used to control animals as to support them, and may be improvised out of a pair of wagon shafts, or the well designed apparatus shown in the illustration may be used, with endless chain which one man can operate. For horse establishments or large studs such a contrivance is worth the cost. There are persons who let out these things for hire.

In France and Germany the most elaborate machines are employed at veterinary establishments and schools, but they are quite

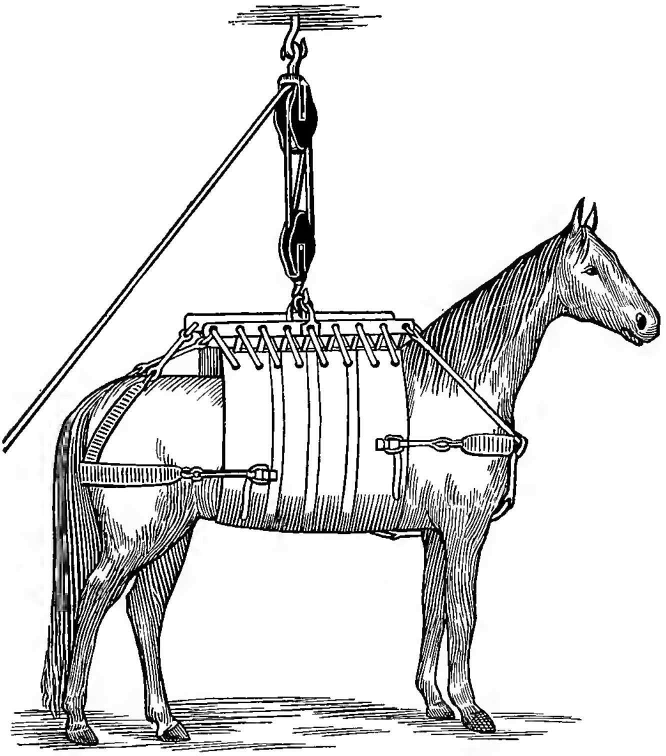


Fig. 58.—Sling.

beyond the reach of horse owners of ordinary means, and rather in the nature of show pieces than needful appliances.

Dogs and cats can generally be rolled in a blanket when either end requires attention—a tooth to be extracted or an ear doctored: a tail to be docked, or a cat's testicles removed. Don't take in the old story of a jack boot for the latter purpose. Nothing more inconvenient can be conceived. When a cat is rolled in any soft and thick substance he helps to restrain himself by fixing his claws into it. If gripped by the scruff of the neck and around the shoulders by one person, while another holds the hind legs, a surgeon can perform such difficult operations as spaying, but mercy as well as convenience point to chloroform (see Anesthesia, at page 389).

Great Danes and mastiffs can be cast like calves and their legs tied. Parrots and other birds should be covered with a soft duster which they will generally lay hold of with the beak, while a broken leg is set, or a tumor excised. They are very good patients as a rule, and need not be killed because of an accident or morbid growth.

Sick Foods—Care of the Sick.—Good hygienic conditions and the supply of suitable food are in most cases of greater importance than medication.

The qualities of a good nurse are not inherited by every man, and alas that it should be said of women also, but the instinct of caring for the sick and the weak is certainly more widely diffused among the gentler sex, and the writer yields to none in his admiration of those sweet souls who will give up nightly rest and daily refreshment for the sake of a morose old pet, unworthy of such loving kindness and tender self-sacrifice. It is essential that an attendant on a sick animal should be a lover of animals: a sympathetic friend, with a quick understanding of their feelings and their needs. Their gratitude is often expressed more sincerely if less volubly than that of human patients. There is a language of the sick as there is of the nursery, without the capacity to form words, and a pleasure in noting recovery, second only to a mother's joy when baby smiles again after acute illness.

One of the most serious faults I have to find with animal nurses is their forgetfulness of the need of sleep. The piano is locked, the blinds drawn, and straw put down in the road, in order to afford the human sufferer a chance of sleep: yet the sick horse or cow is too frequently made an exhibit for interested neighbors.

Horses in long bale stables are kept awake by day on account of indispensable noises, and at night by some weaver or kicker which cannot sleep and will not be quiet. Many horses in great cities die for want of a little peace and quiet when ill.

A sick box should be provided if possible, or a hovel or shelter may be run up in a few hours. Immediate isolation of a sick animal may prove of incalculable value in preventing the spread of infectious disease, and at the same time giving the unfortunate one the best chance of recovery. Pure air without a direct draught upon any part of the patient is an essential. If there are no means of warming a cold stable, it should be remembered that the animal's own heat can be conserved by clothing, bandaging, and hooding, to any extent, and better a cold and pure air than a warm and vitiated one. Expired air, being warmer than that of the surrounding atmosphere, may be expected to rise and make its way out of ventilators placed high in the building. Partitions between sick boxes should always extend to the roof. These apartments should be disinfected and lime-washed as an insurance against infection because there is no clear dividing line between such diseases and others. For instance, the catarrh of the horse may become infectious and the normal resistance to maladies always more or less floating in the air be destroyed. When we speak of glanders breaking out on a ship we do not mean that it arises *de novo*, but that the bad air develops a latent disease. The catarrh of fowls prepares the membranes for the seed of roup, etc.

The floor of the box should be dry and well littered with bedding which will tempt the invalid to lie down. "Of course it should," I can hear a good horseman say, but he may not have seen men spread a bed of moss litter having many hard lumps like bricks in it and that for a sick horse that has never seen that kind of bedding before. Many horses are indisposed to lie down on it for the first time, although healthy and tired. They have got to smell it and think over this new situation when their accustomed straw is gone and something unknown is substituted. So the practical, thoughtful nurse will not use sawdust or pine shavings or some new material, because on high, dry, scientific, sanitary grounds it is what the patient ought to have.

Light.—Most animals when seriously ill, and especially in the early stage when a high temperature is usual, are distressed by a strong light, as are those with diseases of the eye. Some sort of shade may be improvised with a few tacks and an old sack, or if material has to be purchased, some cheap green "union" can be obtained at any dry-goods store. Silence and seclusion then for the very sick and possibly infectious. For the convalescent, the lame and the merely "off color," plenty of light, and a view of other animals and of all that is going on lends cheerfulness and content to the gregarious by instinct who know by familiar sounds what is taking place about the homestead and what to expect next; matters in which bipeds are sometimes so wrapped up as to have no mind for greater things.

In the initial stage of most maladies we have said there is rise of temperature. Constipation is a common accompaniment or immediate sequel. Laxative foods then form a most important item in the provision of the sick. They answer the purpose better than drugs. Aperient drugs are often given because we cannot wait for the effects of laxative foods, but they leave a tendency to recurrence of constipation, as many pill gluttons have discovered.

Before proceeding to describe the various invalid foods it should be quite understood that they are only intended to be given temporarily, and the opportunity is here taken of warning horse keepers and others against the practice of stodging, as it is called among dealers who wish to make horses look fat and full at short notice, and conceal defects. Such foods, long continued, induce very serious forms of indigestion, as they are not properly dealt with in the mouth. (See Indigestion, at page 92.)

Whatever food is offered to a sick animal should be small in quantity and at the right temperature. A scalding mash whose odor has awakened a dormant sense of smell, will only annoy and disgust the patient when he finds he cannot eat it, and when he has once blown over and left it, it should be removed and utilized for pigs or other safe purposes. Cut green meats should not be too wet or handled too freely. If boiled food, such as barley, is to be given, it should be boiled in only just enough water, and a spoonful of salt should be added. There is a crisis often in the illness of an animal, as with his master, and the turn would seem to have relation to a particular time when the right food was offered and taken. The fretful invalid is to be petted and induced to take a mouthful just for the sake of being "chummy," when he will awaken the gustatory sense and take another of his own accord. I have often induced this by fondling a sick animal and introducing a morsel of food into his mouth so that he was compelled to mumble it for a time and ascertain the flavor.

Gruel.—How many horse keepers know how to make gruel? If the doctor is not a practical horseman he will merely order gruel, and the horse may get some burnt mess he will not look at, much less eat.

A convenient quantity for horse or beast is one gallon. One pound of meal, oat, barley, or wheat, is a fair proportion. The vessel should be washed out and the water put in before the meal, to prevent caking at the bottom and burning. Continuous stirring is necessary until the mixture boils; after which it can be set a little aside to simmer. Horses prefer a gruel that is thick, but sloppy foods are as readily taken by cattle, and especially by pigs.

Bran Mash.—This simple mixture is often bedeviled for want of seeing a proper mash made by an experienced stableman. First, then, wash out the bucket with hot water; mix a tablespoonful of salt with three pounds of bran, and stir in three pints of boiling water; keep in the steam by some sort of cover for twenty minutes before turning out the mash. Avoid offering it until cool enough to be eaten. Cold bran mashes need to stand twice as long to get thoroughly soaked. The large broad bran is preferred as a laxative, and if given wet has the desired effect, but dry bran with chaff and hay can be fed to rest horses and others not needing corn as a daily ration with considerable food value. Slow mastication causes it to be digested: a process which does not occur in the quickly swallowed mash.

Linseed and Bran Mash.—This mixture is still more laxative than bran alone and, if horses and cattle will take it, is one of the best of sick foods. Unfortunately, a good many refuse it, unless they have acquired the taste while in health. Any favorite spice, or aniseed and salt may be added as an inducement to such animals as like these things. Most like salt, and the majority of horses and cattle are attracted by the smell of aniseed, of fenugreek, and cummin, or caraway.

An ounce of salt, half a pound of linseed, and a pound of bran should be mixed cold with a gallon of water, and slowly boiled for a couple of hours, with occasional stirring. It should be understood that salt is added where a mash or two is given for its laxative effect, but a small teaspoonful will be plenty if a continuance of this food is necessary. As a matter of fact very few horses will go on eating bran mashes or linseed or any other slops.

Bread.—Most animals will eat bread and it is a desirable food for the sick. If they will take it soaked in water, it is a fairly good laxative, especially for pigs and dogs.

Brown bread, made with treacle or molasses, is often relished by sick horses. The same may be said of the plain bun, but no cakes with currants should be offered to sick animals. Most biscuits consist of flour, sugar, butter, and flavorings, and can be used to tempt the sick. Broken small they are more likely to find appreciation. Carrot tops, cut grass, apples, mangels, swedes, turnips, carrots and parsnips; all growing cereals, and the leaves of many trees may be offered to induce appetite and amuse the patient.

Eggs, Milk and Meat.—In devising foods for sick adults it is sometimes forgotten to offer them milk. All begin on milk, and eggs are but one stage further upward towards flesh food. Many horses and cattle will drink milk in which eggs have been beaten up. A few will take beef tea and mutton broth mixed with vegetable foods, but when beef tea or other meat products are ordered for graminivorous animals they are generally given as drenches from a bottle or horn. The stomach of the horse is not only capable of dealing with small quantities of meat extract, but in certain acid states of the organ can appropriate them with greater profit than ordinary food.

Fermented Liquors, etc.—Sick horses, cattle, sheep, and other species sometimes profit by the judicious administration of alcoholic drinks. Ale, stout, port wine, whiskey, brandy, gin, are each and all recommended in particular cases. The taste for them is not easily acquired, and they should be mixed with water or gruel and horned down, care being taken to sufficiently dilute them to avoid "catching the breath." Half a gallon of beer, or a bottle of wine, or a gill of spirit may be taken to represent a fair amount for one day for a horse or bullock. Alcoholics should not be continued for a long period, or the appetite at first provoked and digestion assisted will be lost, and failure to appropriate food will follow.

Water.—The importance of fresh supplies of pure water cannot be too much insisted on in connection with sick animals. The bucket should not be left in the stable but washed out between each offer of liquid refreshment, and the weight of the bucket should not deter the man from holding it long enough for an invalid to make up his mind whether he will take one, two or three go-downs or none at all. Chilled water, in the language of the stable, means exactly the opposite thing, namely, water with the chill taken off. It would often seem desirable to get a sick beast to take a deep draught of warm or even hot water, as when we wish to promote the action of saline aperients, but animals do not like hot water, and only those accustomed to warm sloppy mashes can be induced to drink at a temperature much above the surrounding atmosphere. Do not, therefore, suppose that an animal is not thirsty or in need of water because he has refused your offer of a warm drink, but let him have it cooler. Many cases of impaction or stoppage with symptoms of colic are due to the want of water in stall-fed animals, and the good farmer will be more concerned to see that a bountiful supply is afforded than to watch the consumption of corn. In my experience grooms are always disposed to give too much of the latter and too little of the former.

CHAPTER XXII

ADMINISTRATION OF MEDICINES

People who own or look after animals should know how to administer medicines as well as which to choose for common occasions. If they do not know what constitutes a dose they can always refer to the Table of Doses, at page 431 of this book.

Custom has a great deal to do with the manner of administration, but the experience of those who have gone before is not to be despised because newer and often better methods have been discovered.

There are advantages to be gained by different forms of medication, and they do not all belong to the new. The nauseous compound may often with advantage be displaced by the hypodermic or intravenous injection, and the bolus by an active principle in a few grains of sugar. On the other hand, good reasons can be adduced for the bulky liquid and the big bolus in certain cases. Concentrated infusions do not have so good effect as the freshly made in larger bulk; yet the art of the pharmacist enables him to produce a concentrated preparation which is analytically the same. The administration of the alkaloids of opium from a given quantity of that drug do not produce exactly the same action as the crude gum, nor does aloin have precisely the same medical value as the dried juice of the aloe.

Some essences or active principles act better than the more bulky substances from which they are obtained, as for instance, santonine is preferable to wormwood, from which it is made. We have therefore to learn what manner and in what form we can best give medicine, and meantime we would be "the first by whom the new is tried; the last to lay the old aside." The old and the new will both be found in the following pages. As the author of " Veterinary Counter Practice," which has been accepted as the dispenser's guide, I have for some twenty-five years received reports as to prescriptions of that class, and continued to improve upon them. For the hypodermic or intravenous list of medicines and doses, I am indebted to Messrs. Parke, Davis & Co., who have made a special study of catering for the needs of veterinary surgeons; their standardized goods being absolutely reliable at all times.

Giving a Ball.—A ball wrapped in paper is better and less likely to slip than one with gelatine coating, especially if one "misses fire" the first time. They should never be given with an inner wrapper of paraffin wax, as this insoluble material has enabled boluses to come out in the evacuations, unaltered.

Giving a ball is not more difficult than swimming. Confidence is the essential equipment in both. A gun or tube with a stiletto running through it is a good thing to use when a horse has ragged teeth or some disease capable of infecting the man through an abrasion of his skin, but for ordinary cases one may proceed as follows: Put on a hemp halter with the tag running free and permitting the mouths to open wide. Turn the animal round in the stall. Be very quiet and don't make a fuss. Go to the right side of the horse's head and take the tongue quietly but firmly in the left hand, turning the tip up against the tush (if he has one) while holding the ball between three fingers and thumb of the right hand. Pull out the tongue in a downward direction and rapidly pass the ball over it as far back as it will go. Leave it there. Withdraw the hand, let go the tongue, pick up the tag and wind it quickly round the mouth to prevent ejection of the ball. Pass to the horse's left side, and watch the channel of the neck half way down. The ball can generally be seen coming as far as the middle of the neck where the gullet passes behind the windpipe and the bulge is no longer visible. The wearing of an old glove saves the hand from a scratch, and by giving confidence enables the operator to land the bolus further back than he might otherwise do—in a position, in fact, where it cannot be spat out again, as the act of swallowing is practically involuntary when a morsel of any kind gets over the dorsum or back of the tongue. Water should then be offered. If the horse is seen to swallow one "go-down" of it, you may be sure that he has taken the pill. Some animals that have been repeatedly balled with nauseous stuffs will retain a bolus until the unsuspicious groom has turned his head. They then quietly drop it out of the mouth. Hence the desirability of seeing it go down the neck, and again in case one has mistaken the swallowing of saliva for the deglutition of the ball, the taking of water after it will be a double insurance. Until recent years medicines were never given to cattle and sheep in the bolus form, as it was supposed that they would be returned in the act of rumination. One's hand can be very badly hurt in giving balls to ruminants and in their case the bolus may be stuck on the end of a stick, or better still, given with a balling gun. Their tongues do not afford us the same hold, nor are they so mobile, and they instinctively cross their jaws when a hand is passed in. All the same they can be balled with a naked hand if one is fairly quick and cautions. The chief personal danger in giving a ball is from what is called a striker—a horse that hits out with his front feet. A very simple contrivance can be employed to prevent this. A sack of corn, not quite full, and slung from a collar round his neck to reach nearly to his knees will keep him from raising a limb with which to strike. Circus horses and such as have been taught boxing by soldiers are apt to be strikers.

Drenching.—Metal bottles have the advantage of not being easily crushed or broken if dropped from a greasy or nervous hand. A hock bottle that allows us to see its contents is better, and the risk of being broken between the animal's teeth is little indeed though much feared by beginners. Medicines should always be amply diluted so as not to "catch the breath," and given in small gulps or "go-downs." A horse's head need be only slightly elevated by a hand under the chin, and for my own part I generally prefer to do without assistance. If one has to drench a really naughty one, he should not be twitched until simpler means have been tried. A halter in the mouth and a broom handle by which to keep his head up (the stable fork has been known to slip and cause injury) or a long twitch with a large enough loop to put in the mouth and go over the face will generally serve a sufficiently patient man.

Getting medicine the wrong way is the result of hurry and of keeping the head up with too big a mouthful at one time. Horses should be drenched slowly. Cattle have bigger throttles, and provided a warning is given by touching the palate with the nose of the bottle, a drench can be poured quickly down the neck of a cow whose head is not turned to one side but held straight and only slightly elevated.

Electuaries.—A very convenient method of giving medicines is that of the electuary or jam form. We should not choose it if giving more or less caustic substances, such as copper and iron salts, zinc or arsenic, but for all the salines and simple neutral preparations of the pharmacopœia, we may doctor horse and pig and other species with drugs mixed with honey or glycerine, molasses or jam, pushing the dose prescribed far back on the tongue. We cannot always do this with swine, but by introducing the medicament little by little just inside the angle of the mouth on one's finger or on a smooth bit of wood, we may get the dose taken in time.

Electuaries are specially advised in throat cases, which see.

Powders.—Many more drugs may be given in this convenient way, mixed with food, than is perhaps generally known. Such bitter things as Epsom salts will generally be taken in a bran mash, with a little salt, or mixed with some favorite food or cattle spice, such as Thorley's food. The table condiments, if they may be so called, which most appeal to the palate of the horse, ox, and sheep are salt, fenugreek, aniseeds, cummin, caraway. Individuals differ greatly in their taste and sense of smell. One will be put off his feed by a bucket that has not been properly cleaned, and another will take chlorodyne with oil of peppermint in it mixed with his food. The powder in food will ever be a favorite form of medication and may be tried if in doubt and before resorting to force.

Giving Medicine to Swine.—Not through the ears or the nostrils should medicines be administered, but guile rather than force advocated in physicking pigs and cats. The large admixture of food in the name of swill or wash that many pigs get, has the effect of debauching the taste, and such swine will take a variety of drugs in their food. For them, too, we may remember the active principles in concentrated form, and often conceal them in a bon bouche, or mix our castor oil with linseed, or prescribe abstinence by way of sharpening the appetite. There will, however, be occasions when we must resort to force, and give the old-fashioned drench. A bottle should never be put in a pig's mouth, unless it be a metal one, and not wanted again. The old shoe is of all instruments the best. The pig patient should not be roped by the lower jaw, but the noose brought over the face, and the cord should not be fixed, but a turn taken round a post, that can be slacked out as needed—a give and take arrangement—while a man gets astride of the recalcitrant pig and lays firm hold of his ears. He will bite the old shoe, and in gratifying his rage, keep swallowing the medicine poured into it. He will neither hurt himself nor depreciate the value of the instrument. I may remark here that I have found some of the most savage and difficult pigs to drench would submit to medication *per rectum,* and take but little notice of the prick of the hypodermic syringe.

Clysters or Enemata.—Medicines introduced into the bowel in soluble form undergo a measure of absorption, and this plan of medication, if not a substitute for oral administration, may be at least ancillary. Glycerine undiluted, forced in by a suitable syringe, acts by osmosis and proves a laxative. Soluble extracts and active principles in solution take effect. Salts, linseed and castor oils, and all the remedies commonly given by the stomach, have more or less action when introduced into the terminal portion of the intestine. Soap enemata, or solutions of Epsom salts, or warm water only, may be prescribed in cases of constipation and impaction, colic and other obstructive troubles, when a pump of some little power may be used to send the fluid a distance into the canal.

Suppositories and pessaries are introduced into the passages for gradual solution, and have marked effect in some intestinal and uterine diseases. The basis of them is cocoa butter, which at ordinary temperatures is solid, but slowly melts at the temperature of the body.

Outward applications, as liniments or embrocations, act by carrying impressions through the peripheral nerves, which spread like a network of cauliflower-like bodies in the skin, where most sensation resides. (See Operations, page 368, also Wounds, at page 295.)

Lotions exert their influence both through nerves and by producing cold and allaying irritation. Injudiciously employed, these outward applications may lead to poisoning by absorption. Mercurials and Spanish fly and carbolic acid for examples.

CHAPTER XXIII

DOSE TABLES, POISONS, ANTIDOTES, ETC.

Dosage.—In compiling a Table of Doses or posological table for animals, one is met with the great variations in the size and weight of individuals of the same species: as, for instance, the pig, which may need a dose of castor oil while weighing half a dozen pounds, or may have grown to a hundredweight before medication becomes necessary. In the following table, then, a pig means of average growth at about one year old, and the prescriber will reckon for a larger or smaller dose as may seem necessary. With a few exceptions, such as strychnia, nux vomica, arsenic, and active principles of specially potent drugs, a considerable margin of safety exists, and very accurate dosage is not so important as the selection of suitable remedies. The great disproportion between pigs of different breeds and varying ages applies also to dogs, and here we take as our standard a dog of the large terrier or small spaniel size, weighing anything from twenty to thirty pounds. Whether you give a teaspoonful more or a teaspoonful less of castor oil will not materially affect the action of the medicine. In the case of those drugs to which dogs are specially susceptible, as nux vomica and carbolic acid, we have erred, if at all, on the safe side, and advise readers to exercise caution.

In the ox, the voluminous stomach and great amount of ingesta at all times present, disperses medicines over an area in which much is lost and taken up in the foodstuff, and experience tells us that medicines given by the mouth should be increased by one-third over and above the dose for the horse of equal body weight. This remark does not fully apply to remedies hypodermically administered, although a somewhat larger dose of most drugs is tolerated by the more phlegmatic bullock, than by the nervous horse.

The dose for a grown sheep, of average size, is reckoned as from one-eighth to one-fourth of that for a bullock.

There are exceptions, in which sheep take very much larger quantities, as, for instance, half an ounce of laudanum to a straining ewe after parturition; or a dram of aloes for a comparatively small dog, as an aperient. If the reader has referred to the text in connection with any disease first, he will not find much difficulty in estimating the required amount of a medicine to be given.

Dose Tables.

Before referring to any article in this table of doses the reader is asked to make himself acquainted with the remarks preceding it, when he will understand why cattle are omitted and will know how to apportion doses for them. For younger animals the doses must be regulated according to age. A horse three years old and upwards, cow and sheep two years, pig one year, dog one year old, the dose as per table; for an animal half the above ages, give half the quantity of medicine, for example—

Horse three years old	Full dose
Horse one-and-a-half years old	Half dose
Horse nine months old	One-fourth the dose
Horse four-and-a-half months old	One-eighth the dose

The terms used in the following table may be understood as follows: Oz. stands for Ounce; Dr. for Dram; Gr. for Grain; D. for Drop.

MEDICINES.	HORSE.	SHEEP.	PIG.	DOG.
Acid Acetyl., Salicyl	1–2 dr.	20 gr.	15 gr.	5–10. gr.
Aether, Sulphuric	½–1½ oz.		½–1½ dr.	15–50 d.
Aloes	2–8 dr.			15–60 gr.
Alum	2–4 dr.	½–1½ dr.	20–60 gr.	10–20 gr.
Aniseed	½–1½ oz.	1–2 dr.	½–2 dr.	—
Antimony, Black	1–3 dr.	10–30 gr.	7–20 gr.	3–10 gr.
Antimony, Tartarized (Tartar-Emetic)	Worms. 1–3 dr.	—	Emetic 4–12 gr.	Emetic 2–6 gr.
	Febrifuge ½–2 dr.	2–6 gr.	1–3 gr.	1–2 gr.
Areca Nut	½–1½ oz.	1–3 dr.	½–2 dr.	½–2 dr.
Aromatic Spirits of Ammonia.	½–2 oz.	1–3 dr.	½–3 dr.	15–60 d.
Asafetida	2–6 dr.	1–2 dr.	15–60 gr.	5–20 gr.
Belladonna Extract	½–2 dr.	5–10 gr.	2–6 gr.	1–4 gr.
Bicarbonate of Soda	½–1 oz.	1–2 dr.	1–2 dr.	10–40 gr.
Bicarbonate of Potash	½–1 oz.	1–2 dr.	1–2 dr.	10–40 gr.
Boracic Acid	1–3 dr.	10–30 gr.	10–20 gr.	5–10 gr.
Bromide of Ammonia	1–3 dr.	10–30 gr.	10–20 gr.	5–10 gr.
Bromide of Potassium.	2–6 dr.	½–2 dr.	¼–1 dr.	10–20 gr.
Barium Chloride	1–2 dr.	15–30 gr.		
Carbonate of Iron	1–3 dr.	15–30 gr.	10–20 gr.	5–10 gr.
Carbonate of Ammonia	1–4 dr.	15–30 gr.	10–20 gr.	5–10 gr.

MEDICINES.	HORSE.	SHEEP.	PIG.	DOG.
Carbonate of Magnesia	1–8 dr.	½–2 dr.	½–2 dr.	15–60 gr.
Castor Oil (Purgative)	½–1½ pint.	2–8 oz	1–3 oz	½–2 oz.
Calumba Powder	2–6 dr.	½–2 dr.	15–60 gr.	10–20 gr.
Calomel	15–60 gr.	4–10 gr.	2–7 gr.	½–3 gr.
Caraway	½–2 oz.	1–2 dr.	½–1½ dr.	—
Cantharides	5–10 gr.	2–6 gr.	1–4 gr.	—
Camphor	1–3 dr.	10–30 gr.	8–20 gr.	2–8 gr.
Carbolic Acid	½–2 dr.	10–20 dp.	6–15 d.	1–5 d.
Cayenne Pepper	1–4 dr.	½–2 dr.	15–60 gr.	8–30 gr.
Chalk	½–2 oz.	1–2 dr.	½–2 dr.	½–1 dr.
Chloride of Ammonia	2–6 dr.	½–1½ dr.	15–60 gr.	10–20 gr.
Chloride of Lime	2–6 dr.	15–60 gr.	10–30 gr.	3–10 gr.
Chinosol	½–1½ dr.	8–20 gr.	5–12 gr.	3–6 gr.
Charcoal	½–1½ oz.	1–4 dr.	½–4 dr.	½–1 dr.
Chloride of Sodium (Common Salt)	½–2 oz. Cow, 8–16oz	1–4 dr.	1–2 drs. Emetic.	10–30 gr.
Chloral Hydrate	2–8 dr.	½–2 dr.	15–60 gr.	5–20 gr.
Chloroform	1–2 dr.	10–30 d.	8–20 d.	3–10 d.
Chlorodyne	2–8 dr.	10–60 d.	10–30 d.	3–15 d.
Chlorate of Potash	1–3 dr.	10–30 gr.	10–20 gr.	3–10 gr.
Cocaine	2–8 gr.	1–3 gr.	½–2 gr.	⅛–1 gr.
Cod-liver Oil	2–8 oz.	3–8 dr.	2–6 gr.	1–5 dr.
Coriander Powder	½–1½ oz.	1–2 dr.	½–1½ dr.	20–60 gr.
Croton Oil	5–10 d.	2–4 d.	5–10 d.	½–2 d.
Cream of Tartar	1–3 oz.	2–5 dr.	1–3 dr.	½–1½ dr.
Cummin	1–3 oz.	1–4 dr.	—	—
Easton's Syrup	½–2 oz.	2–3 dr.	½–2 dr.	½–1½ dr.
Epsom Salts (Sulphate of Magnesia) — purgative	½–1 lb.	1–4 oz.	½–2 oz.	1–4 dr.
Ditto	1–3 oz.	Febrifuge	for Horse	and Cow
Ergot of Rye	½–1 oz.	½–1½ dr.	½–1 dr.	10–30 gr.
Eucalyptus	½–1 dr.	10–20 d.	8–12 d.	2–6 d.
Gentian (powdered)	2–8 dr.	½–2 dr.	15–60 gr	7–20 gr.
Ginger (powdered)	2–8 dr.	½–2 dr.	15–60 gr	7–20 gr.
Glycerine	2–5 oz.	3–8 dr.	2–5 dr.	1–3 dr.
Glauber Salts (Sulphate of Soda)—purgative	½–1 lb.	1–4 dr.	—	½–1½ dr.
Ditto	1–3 oz.	Febrifuge	for Horse	and Cow
Hydrochloric Acid (dilute)	1–3 dr.	10–30 d.	10–20 d.	3–12
Hyposulphite of Soda	½–4 oz.	1–4 dr.	½–1½ dr.	10–40 gr.
Iodine	10–60 gr.	2–5 gr.	1–3 gr.	½–2 gr.
Iodide of Potassium	½–2 dr.	10–30 gr.	4–20 gr.	2–10 gr.
Iodoform	1½–2 dr.	15–30 gr.	10–20 gr.	6–10 gr.
Jalap	—	—	1–4 dr.	½–1½ dr.
Juniper Berries	½–2 oz.	1–3 dr.	½–2 dr.	15–60 gr.
Kamala	1–2 oz.	—	1–2 dr.	30–90 gr.
Laudanum (Tincture of Opium)	1–3 oz.	1–4 dr.	½–2 dr.	10–30 d.
Liquor Ammoniæ, Acetatis (dilute)	2–6 oz.	½–1½ oz.	2–8 dr.	½–2½ dr.
Linseed Oil (purgative)	½–1½ pint.	3–10 oz.	2–6 oz.	

MEDICINES.	HORSE.	SHEEP.	PIG.	DOG.
Male Fern (Liquid Extract)	½–1 oz	1–3 dr	½–2 dr	8–25 d.
Morphia	5–10 grs	1–2 gr.	½–1½ gr	⅛–¼ gr.
Mustard	½–1½ oz	1–2 dr	½–1½ dr	14–20 gr.
				Emetic 2–4 dr.
Nitrate of Potash (Saltpetre)	Febri 1–4 dr	fuge 10–35 gr	8–20 gr	3–10 gr.
Ditto—Diuretic.	Twice the	above doses.		
Nitric Acid (dilute)	1–3 dr	12–35 d	8–20 d	3–8 d.
Nux Vomica	20–60 gr	3–15 gr	2–10 gr	¼–½ gr.
Oak Bark (powdered)	2–5 dr	½–1½ dr	15–60 gr	8–20 gr.
Oil of Juniper	½–1½ dr	8–20 d	5–16 d	2–5 d.
Oil of Mint	20–60 d	5–10 d	4–7 d	1–3 d.
Opium (powdered)	1–2 dr	6–30 gr	5–20 gr	1–4 gr.
Pimento Powder (Sweet Pepper)	2–6 dr	½–1½ dr	20–60 gr	8–20 gr.
Pepper (black)	1–3 dr	15–30 gr	8–20 gr	
Pepper (white)	1–3 dr	15–30 gr	8–20 gr	
Quassia Powder	3–6 dr	½–1 dr	20–30 gr	8–20 gr.
Quinine (Sulphate)	¼–2 dr	5–15 gr	3–10 gr	1–4 gr.
Resin	½–1 oz	1–1½ dr	½–1 dr	
Rhubarb (powdered)	½–1 oz	2–3 dr	1–2 dr	10–30 gr.
Santonin	15–40 gr	3–15 gr	2–10 gr	1–5 gr.
Salicylate of Soda	2–4 dr	25–45 gr	15–30 gr	8–30 gr.
Tannic Acid	½–1½ dr	10–20 gr	8–16 gr	2–8 gr.
Tincture of Aconite (Fleming's	10–25 d	2–8 d	2–6 d	1–3 d.
Tincture of Arnica	½–1½ oz	1–1½ dr	½–1 dr	10–20 d.
Tincture of Benzoin	½–2 oz	1–3 dr	1–2 dr	10–35 d.
Tincture of Catechu	½–2 oz	1–4 dr	1–3 dr	1–1½ dr.
Tincture of Ginger	½–2 oz	2–4 dr	1–1½ dr	10–25 d.
Tincture of Iron	½–4 dr	10–60 d	5–20 d	3–10 d.
Turpentine	½–2 oz	1–4 dr	½–1 dr	15–50 d.

1076. Weights, Measures, and Other Substitutes:

One small Dessertspoonful	One-quarter of an ounce
One small Teaspoonful	One-eighth of an ounce (or one dram)
Sixty Grains or Drops	One dram
One small Tablespoonful	One-half ounce
Two small Tablespoonfuls	One ounce
One small Wineglassful	Two ounces
One Teacupful	Six ounces
One Breakfastcupful	Ten ounces or half-pint

Balls for Horses.

COMMON MASS.

Fine dry Linseed Meal and Glycerine enough to make a stiff paste.

To be used with active ingredients to make balls up to a convenient size for administration.

ALTERATIVE BALLS.

For the improvement of the animal's condition, their action being gradual but more or less lasting although the immediate effects are not appreciable.

1.	Hard Soap	3 Drams
	Resin	2 Drams
	Aloes	1 Dram
	Sweet Pepper	2 Drams

Molasses, enough to make into a ball.

2.	Emetic Tartar	1 Dram
	Linseed Meal	4 Drams
	Curd Soap	2 Drams
	Aloes	1 Dram

Honey, enough to make into a ball.

3.	Aloes	100 Grains
	Nitre	90 Grains
	Black Antimony	60 Grains
	Ginger	120 Grains
	Linseed Meal	3 Drams

Glycerine, enough to make into a ball.

4.	Barbadoes Aloes	2 Drams
	Soft Soap	3 Drams
	Aniseed	2 Drams
	Gentian	1 Dram

Mix.

5.	Nitrate of potash	1 Dram
	Resin	2 Drams
	Cummin	1 Dram
	Fenugreek	1 Dram
	Salt	1 Dram
	Liver Antimony	1 Dram

Syrup, enough to make into a ball.

6.	Milk of Sulphur	2 Drams
	Cream of Tartar	1 Dram
	Ginger	1 Dram
	Fennel	1 Dram
	Cummin	1 Dram
	Nitre	1 Dram
	Aloes	30 Grains

Treacle, enough to make into a ball.

ALOETIC OR PHYSIC BALL (See Physicking, at page 363).

Barbadoes Aloes	5 Drams
Sweet Pepper	1 Dram
Geutian	1 Dram

Soft Soap or Honey, enough to make into a ball.

This is an ordinary dose for a carriage or light horse. Six, seven, and as much as eight drams may be given to heavy horses of the Shire and Percheron breeds. Ginger is often mixed with physic balls for horses disposed to gripe.

ASTRINGENT BALLS FOR SCOURGING AND SUPERPURGATION.

1.	Catechu Opium Oak Bark } of each	1 Dram
	Flour	6 Drams

Syrup, enough to form a rather large ball, or two small ones.

2.	Oak Bark	4 Drams
	Prepared Chalk	4 Drams

Honey, enough to make into a ball.

3.	Cassia Bark	4 Drams
	Bismuth Carbonate	2 Drams
	Aniseed	1 Dram

Syrup enough to make into a ball.

4.	Elm Bark	2 Drams
	Oak Bark	1 Dram
	Catechu	1 Dram
	Opium	1 Dram
	Burnt Alum	1 Dram
	Extract of Witch Hazel	1 Dram

Treacle, enough to make into a ball.

PAIN KILLERS.

1.	Extract of Indian Hemp	4 to 6 Drams

Linseed Meal, enough to make a ball.

2.	Chloral Hydrate	¾ to 1½ Ounces
	Extract of Belladonna	2 Drams

Meal, enough to make into a ball.

The above recipes are suitable for doping a horse that won't stand to be clipped. Much larger doses of chloral are given, but the foregoing should make an animal drowsy and indifferent.

CONDITION BALLS.

These are in the nature of alterative and tonic, as well as liver stimulants. Young horses fresh up from grass will do best with No. 1. Old horses with livers overtaxed by hard feeding should have the calomel contained in No. 3.

1.	Iron Carbonate	50 Grains
	Sulphur	100 Grains
	Nitre	90 Grains
	Liver of Antimony	60 Grains
	Fenugreek	100 Grains
	Gentian	100 Grains

Syrup, enough to make into a ball.

One daily for a week; then twice weekly.

Newmarket Trainer's Condition Balls.

2.	Capsicum	20 Grains
	Barbadoes Aloes	35 Grains
	Nitrate Potassium	60 Grains
	Resin	50 Grains
	Emetic Tartar	35 Grains
	Fine Oatmeal	4 Drams

Molasses, enough to make a ball.

One ball on alternate nights.

3.	Calomel	25 Grains
	Black Antimony	55 Grains
	Ginger	1 Dram
	Aniseed	1 Dram
	Caraway	4 Drams

Treacle, enough to make into a ball.

One to be given at intervals of five days, and only three in all.

CORDIAL OR STIMULATING BALLS.

For horses done up after hunting or racing or excessive labor, and indisposed to feed.

1.	Ammonia Carbonate	100 Grains
	Gentian Aniseeds Caraways	100 Grains
	Sweet Pepper Cummin Fenugreek of each	1 Dram

Syrup, enough to make into a ball.

May be repeated in three hours or more.

2.	Camphor	2 Drams
	Ammonia Carbonate	1 Dram
	Extract of Cinchona	1 Dram
	Extract of Chamomiles	30 Grains
	Extract of Taraxacum	30 Grains
	Wheat Flour	2½ Drams

Glycerine, enough to make into a ball.

Not less than six hours should intervene before giving a second dose.

3. Pimento
Gentian
Peruvian Bark
Ginger
Capsicum
Ammonia Carbonate
Aniseed
Caraway
} of each................ 20 Grains
Linseed Meal and Treacle enough to make a ball weighing an ounce.
May be repeated at short intervals.

COUGH BALLS.

For acute coughs, balls are not so desirable as electuaries, and the following recipes are intended for bronchial, lung and stomach coughs, which are disposed to become chronic, or develop into thick wind, broken wind, and roaring (see those subjects).

1. Extract of Ipecacuanha	20 Grains
Extract of Opium	30 Grains
Extract of Belladonna	40 Grains
Camphor	20 Grains
Stockholm Tar	100 Grains

Linseed Meal and Glycerine, enough to make a ball weighing about one ounce.

This is suitable for the hard cough of pleurisy and such as follows sudden chills. One every twelve hours at first, then once a day, and afterwards occasionally, when not doing well.

2. Extract of Hyoscyamus	1 Dram
Extract of Belladonna	30 Grains
Camphor	90 Grains
Nitrate of Potash	100 Grains
Chloral	100 Grains
Licorice Powder	3 Drams

Syrup of Squills, enough to make into a ball.

This is suited to spasmodic coughs of the asthmatic type, to be given at intervals of four hours during one day.

3. Extract of Ipecacuanha	10 Grains
Sulphate of Potash	60 Grains
Powdered Squill	30 Grains
Arsenious Acid	5 Grains
Carbonate of Soda	15 Grains
Chloral	60 Grains

Linseed Meal and Stockholm Tar, enough to make a convenient sized ball.

This is suitable for broken wind for occasional administration when the cough is unusually bad; or this:

4.	Arsenious Acid	6 Grains
	Cream of Tartar	1 Dram
	Digitalis Leaves	1 Dram
	Opium	25 Grains
	Mutton Suet	4 Drams
	Creosote	20 Drops

Common Mass, sufficient to make into a ball.

5.	Acetate of Ammonia	1 Dram
	Sulphate of Potash	2 Drams
	Ipecacuanha	30 Grains
	Nitre	100 Grains
	Chloral	90 Grains

Linseed Meal and Glycerine, enough to make into a ball of about one ounce weight.

This dose is suitable for dry, hard cough, in the acute stage of bronchitis, and that of old horses subject to relapses.

6.	Chlorodyne	6 Drams

Linseed Meal or Flour, enough to make a ball.

For acute cough of undetermined cause.

For Profuse Staling or Diabetes.

1.	Iodine Crystals	1 Dram
	Iodide of Potassium	1 Dram

Linseed Meal and Syrup, enough to make a one ounce ball.

One daily.

2.	Powdered Nut Galls	100 Grains
	Opium	40 Grains
	Acetate of Lead	15 Grains
	Gentian	5 Drams

Syrup, enough to make a ball.

One each night.

Diaphoretic or Sweating Ball, for Hidebound.

Emetic Tartar	1 Dram
Nitre	4 Drams
Guaiacum	90 Grains
Sulphur	2 Drams

Treacle and Flour, enough to make a fair sized ball.

Only two or three such balls should be given, and at the early stage of treatment, with intervals of twenty-four hours.

Diuretic or Staling Balls.

1.	Powdered Sulphur	2 Drams
	Powdered Nitre	3 Drams
	Powdered Resin	2 Drams

Soft Soap, enough to make a ball.

One occasionally for gross and greasy subjects.

2.	Aloes (Cape)	80 Grains
	Hellebore	15 Grains
	Resin	2 Drams
	Nitre	1 Dram

Linseed Meal and Treacle, enough to make a ball of one ounce.

Suited to big legs and fevered feet. One occasionally.

3.	Curd Soap	½ Ounce
	Resin	3 Drams
	Sulphur	2 Drams

Flour and Molasses, enough to make a ball.

One occasionally.

4.	Venice Turpentine	4 Drams
	Sulphur	4 Drams

Mix.

5.	Aloes	150 Grains
	Nitre	150 Grains
	Soap	100 Grains
	Gentian	4 Drams

Glycerine, to make a ball.

Monday Morning Leg, or Œdema Balls.

1.	Hellebore in Powder	15 Grains
	Copper Sulphate	1 Dram
	Zinc Sulphate	30 Grains
	Nitrate of Potash	2 Drams
	Venice Turpentine	2 Drams
	Aloes	90 Grains

Syrup, enough to make a ball.

(See the subject of Œdema or Big Leg; also Grease.)

2.	Dried Sulphate of Magnesia	6 Drams
	Nitre	2 Drams

Linseed and Treacle, enough to make a ball.

Fever Balls.

When horses are overdone their temperature runs up and there are slight shivers (rigors) and loss of appetite without any definite disease. If a ball of the following kind is given it rallies the vital powers and reduces the time required for a natural cure.

1. Camphor	1 Dram
Tartrate of Antimony	1 Dram
Nitre	1 Dram
Extract of Gentian	1 Dram
Extract of Nux Vomica	15 Grains

Linseed Meal and Glycerine, enough to make a ball.

Not more than two should be given and an interval of twelve hours should elapse between them.

2. Carbonate of Ammonia	2 Drams
Opium in Powder	30 Grains
Cream of Tartar	2 Drams

Oatmeal and Syrup, enough to make a one ounce ball.

Intervals of 12 hours should be allowed, and not more than three doses in all.

3. Acetate of Potash	1 Dram
Camphor	40 Grains
Angostura Bark	1 Dram
Carbonate of Soda	2 Drams
Juniper Berries	1 Dram

Flour and Glycerine, enough to make a ball.

At six hour intervals.

4. Barbadoes Aloes	2 Drams
Ammonia Carbonate	2 Drams
Gentian	3 Drams

Syrup, to make a ball.

5. Quinine	1 Dram
Linseed Meal	7 Drams

Syrup, to make a ball.

6. Tincture of Aconite	20 Drops
Acetate of Potash	1 Dram
Fine Oatmeal	7 Drams

Treacle, enough to make a ball.

Only one to be given.

LIVER BALLS.

1. Blue Pill	2 Drams
Aloes	1½ Drams
Ginger	3 Drams
Nitre	1 Dram

Glycerine, enough to make a ball.

One only.

2. Calomel	1 Dram
Barbadoes Aloes	2 Drams
Sulphate of Soda	3 Drams

Gentian and Syrup, enough to make a ball.

One only.

Yellowness of the membranes and sour breath indicate the need of such a ball as the above. See Diseases of the Liver and Indigestion.

TONIC BALLS.

1.	Quinine Iron Sulphate Gentian Fenugreek Aniseed Ginger Cummin Nitre	of each 1 Dram

Syrup, enough to make into a ball.

Twice daily.

2.	Extract of Cinchona	2 Drams
	Carbonate of Ammonia	1 Dram
	Carbonate of Iron	2 Drams
	Gentian	3 Drams

Syrup, enough to make a ball.

3.	Cassia Bark	1 Dram
	Peruvian Bark	3 Drams
	Gentian	4 Drams

Syrup, enough to make a ball.

Night and morning.

WORM BALLS.

1.	Santonine	1 Dram
	Extract of Male Fern	1 Dram
	Barbadoes Aloes	2½ Drams
	Venice Turpentine	1 Dram
	Kamala	2 Drams

Syrup enough to make a ball.

To be given fasting.

2.	Extract of Calabar Bean	5 Grains
	Kousso	6 Drams
	Jalap	2 Drams

Glycerine, enough to make a ball.

3.	Thymol	15 to 60 Grains
	Santonine	40 Grains
	Venice Turpentine	4 Drams

Linseed Meal, enough to make a ball.

4.	Aloes	3 Drams
	Extract of Gentian	3 Drams
	Santonine	1 Dram

Mix. A pint of Linseed Oil is recommended a week later.

5.	Finely Ground Tobacco	1 Dram
	Emetic Tartar	1 Dram
	Sulphate of Iron	2 Drams

Linseed Meal and Syrup, enough to make a ball.

Electuaries.

The following is specially recommended for sore throats and laryngitis where a ball or draught would throw the patient into a paroxysm of coughing, but the reader is advised to make a very full use of this form of medication, employing all but irritating drugs such as would scald or disturb his own mouth. Reference has been made to this matter in the introductory remarks. Nearly all the prescriptions given for balls are suitable for electuaries. Most of the powders may be given in the same way if animals refuse to take them in food.

Electuary for Sore Throat and Cough.

Extract of Belladonna	1 Ounce
Nitrate of Potash	1 Ounce
Chlorate of Potash	1 Ounce

Honey, sufficient to make the mass of jam-like consistence.

Dose, a teaspoonful twice or more in twenty-four hours. In Laryngitis it may be given every four hours, during the acute stage.

Electuary for Wooden Tongue.

Red Iodide of Mercury	20 Grains
Iodide of Potassium	1 Dram

Rub together and add enough run honey to make it homogeneous. Half this amount to be applied to the sores, and subsequently swallowed by the beast. Give it once daily until cured.

Electuary for Aphtha in Lambs, and Sore Mouths.

Alum, powdered fine	1 Dram
Boracic Acid	4 Drams

Honey, enough to make a stiff paste.

Apply daily.

Electuary for Painful Udders.

Camphor, powdered fine (by dropping spirit of wine on it).	
Extract of Belladonna	1 Ounce
Lanoline Ointment	4 Ounces

To be well mixed in a mortar and kept in a closed tin. Apply with massage, and wipe clean, if suckling young.

Draughts or Drenches.

It is important to freely dilute medicines given in liquid form, as they act better generally and do not cause animals to cough while taking them. Extra trouble should not count as an objection.

Aloetic Draught.

In cases of stoppage, where time will not allow of a ball being dissolved, a fluid is often ordered, but the resin of aloes is insoluble in water, and the dose must be well shaken or the most valuable portion will be wasted.

Barbadoes Aloes	1 Ounce
Boiling Water	1 Pint
Tincture of Ginger	1 Ounce

Dissolve as much of the aloes as possible in the water, and pour into drenching bottle; add the ginger essence to the residue, and to the draught, shaking freely and administering while warm.

Colic or Gripe Draughts, Fret Drinks, Etc.

Colic Draught.

Chloride of Barium	1 to 2 Drams
Syrup of Poppies	1 Ounce
Water	1 Pint

This is suitable to colic arising from stoppage, and where the action of aloes would be too slow. See also under Hypodermic Treatment, together with digitaline.

Spasmodic Colic.

1. Spirit of Turpentine	2 Ounces
Laudanum	1 Ounce
Water	5 Ounces
Linseed Oil	12 Ounces

Shake together.

2. Sweet Spirit of Nitre	3 Ounces
Chlorodyne	6 Drams
Water	15 Ounces

Mix.

3. Tincture of Ginger	1 Ounce
Tincture of Opium	1 Ounce
Chloric Ether	1 Ounce
Water to make	1 Pint

Mix.

4. Extract of Indian Hemp	6 Drams
Castor Oil	8 Ounces
Olive Oil	8 Ounces

Mix.

5.	Rye Whiskey	8 Ounces
	Sal Volatile	1 Ounce
	Dill Water	1 Pint

Mix.

FLATULENT COLIC.

1.	Aromatic Spirit of Ammonia	1 Ounce
	Camphor Water	1 Pint

Mix.

2.	Chlorinated Lime	1 Dram
	Brandy	5 Ounces
	Water	1½ Pints

Mix.

3.	Chloral	2 Drams
	Camphor	3 Drams
	Whiskey	5 Ounces
	Peppermint Water	15 Ounces
	Linseed Oil	12 Ounces

Mix. Shake well before giving.

Repeat at two-hour intervals if still blown. Knead the flanks with knuckles. Back rake. See article on various forms of Colic, at pages 100 to 107.

FEVER DRAUGHTS.

1.	Tincture of Opium	2 Drams
	Tincture of Gentian	4 Drams
	Nitrate of Potash	4 Drams
	Caraway Water	15 Ounces

Mix.

2.	Antimonial Wine	1 Ounce
	Syrup of Poppies	1 Ounce
	Water	15 Ounces

Mix.

3.	Chlorate of Potash	1 Dram
	Nitrate of Potash	4 Drams
	Infusion of Gentian	1 Pint

Mix.

All the remedies mentioned under the heading of fever balls can be freely mixed with water and given as draughts.

TONIC DRAUGHTS.

All the drugs mentioned in the list of tonic balls and powders may be shaken up with water and given as draughts, but the following can only be given in liquid form:

1. Carbonate of Ammonia	2½ Drams
Extract of Chamomile	1 Dram
Infusion of Gentian	1 Pint

Mix.

2. Quinine	1 Dram
Dilute Sulphuric Acid	3 Drams
Infusion of Quassia	to 1 Pint

Dissolve quinine in acid and the infusion.

3. Tincture of Iron	3 Drams
Syrup of Orange	1 Ounce
Water	to 1 Pint

4. Extract of Nux Vomica	15 Grains
Extract of Gentian	2 Drams
Infusion of Calumba	to 1 Pint

Mix.

5. Quinine	40 Grains
Dilute Nitro-hydrochloric Acid	3 Drams
Extract of Chamomile	1 Dram
Aniseed Water	to 1 Pint

Mix. Dissolve quinine in acid and add to aniseed water and extract rubbed down in mortar.

Horse Powders.

These are also suited for cattle and sheep to be got into show condition, and to assist in fattening and promoting a shiny coat. Very small doses regularly given have much more effect than large ones at longer intervals.

ALTERATIVE CONDITION POWDERS.

1. Nitrate of Potash (nitre)	40 Grains
Black Antimony	30 Grains
Resin	30 Grains
Sulphur	40 Grains
Fenugreek	60 Grains

Mix for a single dose. Twice a day regularly.

2. Fennel Fruit	1 Dram
Aniseeds	1 Dram
Nitre	1 Dram
Liver Antimony	30 Grains

Mix.

3.	Cream of Tartar	1 Dram
	Nitre	½ Dram
	Ginger	½ Dram
	Gentian	1 Dram

Mix.

NEWMARKET CONDITION POWDERS.

Calomel	15 Grains
Sulphur	2 Drams
Aniseed	2 Drams

Mix.

This dose should only be given once a week, and three times in all.

SHOW CONDITION POWDERS.

Nitre	of each ½ Dram
Gentian	
Caraway	
Cummin	
Aniseed	
Ginger	
Sulphur	
Fenugreek	

Mix for night and morning dose.

APPETIZING POWDER.

Grains of Paradise	of each 2 Ounces
Licorice Root, ground	
Ginger	
Sulphur	
Nitre	
Cummin	
Caraway	
Fenugreek	
Fennel	
Chamomiles	
Gentian	
Aniseed	
Locust Bean Meal	10 Ounces

Mix.

A tablespoonful twice a day with the food, damped.

CORDIAL POWDERS.

These are given to horses that lose their appetite and refuse food after trotting matches, or hunters that "fade" at the end of the day.

1.	Ginger	2 Drams
	Salt	1 Dram
	Capsicums	20 Grains
	Aniseed	2 Drams
	Pimento	2 Drams

Mix with a small feed most liked by the individual horse.

2.	Cinnamon or Cassia Bark	2 Drams
	Fenugreek	2 Drams
	Aniseed	2 Drams
	Oil of Rhodium	3 Drops

Mix.

The cordial or aromatic powders which frequently recur in the above recipes may be mixed in various proportions, as different horses take them freely or not. All the barks and seeds mentioned are true stimulants which do not have a reaction, but should not be habitually used, or they lose power, while becoming a necessity.

Cough Powders.

Such valuable drugs as tar and asafetida are often omitted because some horses refuse them, and the owner should ascertain his animals' tastes and may then often save the trouble of giving balls, as we have known horses that would eat most nauseous substances—as judged by human palates.

1.	Aniseed Ammoniacum Camphor } of each	1 Dram
	Wheat Flour, enough to make one ounce.	

2.	Belladonna Leaves, powdered	100 Grains
	Squill	60 Grains
	Nitre	100 Grains

Mix.

3.	Digitalis Leaves	60 Grains
	Emetic Tartar	60 Grains
	Licorice Powder	2 Drams

Mix.

4.	Ipecacuanha	1 Dram
	Squill	½ Dram
	Sulphate of Potash	1 Dram

Mix.

For Broken-Winded Cough.

Arsenious Acid	6 Grains
Chloral	1 Dram
Digitalis	½ Dram
Belladonna Leaves	½ Dram

Mix with a mash, disguised with salt and horse spice. One at night.

Diuretic and Diaphoretic Powders.

All the dry drugs and chemicals mentioned in the list of fever balls and draughts can be given in the same doses in the form of powders, mixed with suitable food. The following are convenient to keep made up, as they do not attract moisture from the air:

1.	Nitrate of Potash	1 Dram
	Dried Sulphate of Magnesia	3 Drams
	Bicarbonate of Soda	1 Dram
	Fine Oatmeal	1 Ounce

Mix.

2.	Chlorate of Potash	1 Dram
	Dried Carbonate of Soda	1 Dram
	Nitre	2 Drams
	Fenugreek	1 Ounce

Fever Powders.

These are given for swelled legs, grease, and hidebound.

1.	Sulphur	2 Ounces
	Nitre	1 Ounce
	Salt	1 Ounce

Mix in a mash of bran.

2.	Resin	2 Drams
	Nitre	4 Drams
	Hellebore	15 Grains

3.	Juniper Berries	1 Dram
	Sulphur	4 Drams
	Epsom Salts	2 Ounces

Epsom Salts in doses of two to six ounces should be frequently given to the subjects of grease. With salt and aniseed in a bran mash most horses will eat this bitter drug.

Tonic Powders.

Both mineral and vegetable substances are used as tonics, but iron has a constipating effect on most subjects, and bran and linseed should be given where grass or roots are not being fed.

Mineral Tonic.

Sulphate of Iron	1 Dram
Sulphate of Copper	½ Dram

Mixed with damped food.

Vegetable Tonic.

Cinchona Bark	½ Ounce
Gentian Root	½ Ounce
Salt	2 Drams

Mix.

Mixed Mineral and Vegetable Tonic.

Sulphate of Iron		30 Grains
Sulphate of Copper		30 Grains
Quinine		20 Grains
Gentian	of each	½ Dram
Chamomiles		
Calumba		
Chiretta		
Aniseed		
Caraway		
Fenugreck		
Cummin		

Mix for one dose.

Worm Powders.

Dried Sulphate of Iron	40 Grains
Santonine	60 Grains
Table Salt	4 Drams

To be given in a handful of damped meal after a fast.

Tartarized Antimony	100 Grains
Sulphate of Iron	80 Grains
Ground Areca Nut	4 Drams

Mix.

For outward applications, see pages following Hypodermic remedies.

Cattle Medicines.

The medicines already mentioned for horses are given to cattle in rather larger doses. See Introductory instructions at page 431. The following are especially used for cattle:

Alterative Powder for Show Beasts.

Antimonious Sulphide	1 Part by weight
Flowers of Sulphur	4 Parts by weight
Nitrate of Potash	1 Part by weight
Gentian	2 Parts by weight

Dose, one to two tablespoonfuls daily, or half the quantity twice a day.

Against Milk Fever.

Chinosol	80 Grains
Sweet Pepper	½ Ounce
Epsom Salts	12 Ounces

To be given in a quart of gruel near calving.

CHILL DRENCH.

As a cordial and stimulant for a beast with rigors or shivering fit:

1.	Ginger	4 Drams
	Capsicum	20 Grains
	Carbonate of Ammonia	4 Drams
	Mustard	1 Ounce
	Nitre	1 Ounce
	Spirit of Camphor	½ Ounce
	Whiskey	4 Ounces
	Gruel	1 Quart

2.	Sweet Spirit of Nitre	3 Ounces
	Laudanum	2 Drams
	Tincture of Ginger	½ Ounce
	Peppermint Water	1 Quart

CLEANSING DRENCHES.

A purgative in most cases acts favorably in preventing fever and udder troubles, and favors the contraction of the womb, if reliable ergot is included in the mixture.

1.	Aloes	1 Ounce
	Ergot	1 Dram
	Ginger	1 Ounce
	Salts	12 Ounces

Mix and give in a quart of warm water soon after calving.

2.	Ergot of Rye in Powder	2 Drams
	Aloes	3 Drams
	Ginger	1 Dram
	Nitre	½ Dram
	Bicarbonate of Potash	2 Drams
	Epsom Salts	14 Drams

Mix in a quart of warm water or mild ale.

3.	Berries of Bay Laurel	1 Ounce
	Nitre	1 Ounce
	Myrrh in Powder	2 Drams
	Epsom Salts	1 Pound

To be given in a quart of hot water.

DRENCHES FOR COUGHS AND COLDS.

Essence of Peppermint	40 Drops
Oil of Eucalyptus	60 Drops
Chlorodyne	3 Drams
Sal Volatile	1 Ounce

To be given in a quart of linseed tea.

Felon Drink.

Spirit of Camphor	2 Drams
Laudanum	2 Drams
Antimonial Wine	1 Ounce
Spirit of Nitre	1 Ounce
Cold Water	1 Pint

Husk or Hoose Drench.

Spirit of Turpentine	½ to 2 Ounces
Oil of Eucalyptus	2 Drams
Linseed Oil	4 to 8 Ounces

Mix.

Best given after a fast.

Intratracheal Injection.

Spirit of Turpentine	1 Dram
Carbolic Acid	20 Drops
Chloroform	30 Drops

Mix. Inject slowly.

See article on Husk. Also Hypodermic Remedies.

Sheep Medicines.

These are the same as used for cattle. See introduction to this chapter and dose table. The following are remedies more particularly used for sheep:

Heaving or Straining Drench.

Brandy	2 to 4 Drams
Laudanum	2 to 4 Drams
Warm Milk	1 Gill

Fluke Mixture.

Spirit of Turpentine	3 to 4 Drams
Cow's Milk	1 Gill

This dose to be given every fifth day. At the same time the powders following should be given daily in the food:

Sulphate of Iron	25 Grains
Salt	1 Dram
Cinchona Bark	1 Dram
Gentian	1 Dram

Mix for one dose.

For Foot Rot lotions, salves, dressings, powders, liniments, dips, oils, etc., see Outward Applications and miscellaneous recipes at pages 456 and 474.

Medicines for Pigs.

Comparatively few drugs are employed in pig doctoring, and we had better know their action fully than employ a number of which we know but little. Madder, Armenian bole, and turmeric, often found in pig powders and recipes for swine medicines, may be discarded as mere coloring matters of no medicinal value. The black sulphur generally prescribed has no greater merit than the hay on the outside of a rick. The dark color is due to the sublimation in an iron vessel and the outside is more or less ferruginous. The best and simplest of aperients, laxatives and alteratives, according to the dose given, is sublimed sulphur, or flowers of sulphur, as it is called. It has the merit of being taken without suspicion by most pigs in a mash or meal of swill.

APERIENT POWDER.

Powdered Jalap	1 Part
Sulphur	2 Parts
Fenugreek	1 Part

Dose, from one teaspoonful to four ounces.

Castor Oil	1 Part
Linseed Oil	2 Parts

From a teaspoonful upwards.

Croton Oil	1 to 6 Drops
Castor Oil	1 to 2 Ounces

Mix.

Calomel	2 to 8 Grains
Rhubarb Root	½ to 2 Drams

DIARRHEA OR SCOUR.

First, a dose of castor oil, then the following powders:

Bismuth	20 Grains
Opium	3 Grains
Prepared Chalk	2 Drams

See remedies for Scour in Calves.

The foregoing dose may be given three or four times in cold food, which should be astringent itself. See Sick Foods, etc., at page 418.

CONDITION POWDER.

Black Antimony	1 Part
Sulphur	4 Parts
Nitre	1 Part
Fenugreek	2 Parts
Aniseed	2 Parts
Gentian	2 Parts

Mix.

A teaspoonful night and morning in the food.

POWDERS FOR SKIN ERUPTIONS (ECZEMA, ETC.).

Antimonious Sulphide	1 Part
Bicarbonate of Soda	1 Part
Rhubarb Root	1 Part
Dried Sulphate of Magnesia	4 Parts
Fenugreek	6 Parts

Mix.

One or two teaspoonfuls twice daily.

POWDERS FOR RHEUMATISM.

1. Acid Acetyl Salicyl	10 to 30 Grains

Mix with any favorite food. Three doses at eight-hour intervals.

2. Salicylate Sodium	10 to 40 Grains
Fine Linseed Meal	1 Ounce

Mix.

Three times in the day.

These powders are also given for joint-ill. See cattle and horse remedies for such as have to be given in drench form.

WORM POWDERS.

Pigs most often have the large round worms (*Ascaris Suis*) and while very young.

Santonine	5 to 15 Grains
Sugar	20 Grains
Oatmeal	1 Teaspoonful

To be given after a fast of nearly a day.

Ground Areca Nut	1 Dram
Kamala	1 Dram

Mix with a handful of meal after a fast.

These are most suitable for tapeworms.

If a pig has to be drenched for worms, spirit of turpentine, extract of male fern, aloes, and other worm destroyers can be chosen. See Table of Doses at page 431. See outward remedies and general recipes at page 456.

Dog Medicines.

As an aperient and liver stimulant for lazy and over-indulged dogs, and such as show yellowness in the eye:

1.	Blue Pill	3 to 5 Grains
	Compound Rhubarb Pill	10 Grains

Mix for one dose.

2.	Calomel	2 to 4 Grains
	Compound Extract of Colocynth	4 Grains
	Extract of Colchicum	⅛ to ¼ Grain

The latter are suited to the gouty and old with infirmity of temper and demanding all the hearth-rug to themselves.

Aloes	40 to 100 Grains
Ginger	10 Grains

Syrup, to make a ball.

Or given in a capsule of gelatine.

Alterative Pill.

Aloes	5 to 10 Grains
Compound Rhubarb Pill	5 Grains

Mix.

To be given occasionally.

Diarrhea or Scour.

Catechu	10 Grains
Kino	5 Grains
Bismuth	10 Grains

Honey, to make a pill.

One every six hours.

Cough Pills.

Compound Pill of Soap and Opium	5 to 10 Grains

Night and morning.

Camphor	1 Grain
Ipecacuanha	¼ Grain
Squill	1 Grain

Syrup, enough to make a pill.

Every eight hours.

Distemper Pills.

The following are given on the strength of other folks' recommendation. Only the iodide of potassium has proved antagonistic to the distemper virus in the author's experience.

1. Compound Ipecac Powder	1 to 2 Grains
James' Powder	2 Grains
Quinine	1 to 2 Grains

Mix. Twice a day.

2. Yellow Sulphide of Mercury	½ Grain
Compound Rhubarb Pill	2 Grains

Alternate nights.

3. Salicine	3 Grains
Carbonate of Soda	10 Grains

One at night.

4. Permanganate of Potash	1 Grain
Carbonate of Bismuth	4 Grains

Mix with common mass to make a pill. One at night and morning.

These are given when the breath is fetid and diarrhea appears.

Iodide of Potassium	2 to 8 Grains
Flour	10 Grains

Syrup, enough to make a pill.

Three times a day in the early stage.

In the convalescent period, tonics such as those to follow may be given. They seem to fortify the dog against a relapse.

Tonic Pills.

Sulphate of Iron	1 Grain
Quinine	1 Grain
Flour	10 Grains

Syrup of Orange, enough to make a pill.

Carbonate of Iron	4 Grains
Quinine	1 Grain
Extract of Chamomile	1 Grain

Glycerine, enough to make a pill.

This is preferable to No. 1 if the bowels are irritable.

Worm Pills.

Worm remedies often fail for want of the preliminary fast on the patient's part, but all vermicides are uncertain. See Worms, at page 396.

Santonine	3 to 10 Grains
Aloes	10 to 60 Grains

Syrup, enough to make large pill.

To be given fasting.

Santonine	3 to 10 Grains
Oil of Male Fern	5 to 15 Drops
Spirit of Turpentine	15 Drops
Kamala	20 Grains

Mix

Areca Nut, ground fresh, two grains to each pound weight of the dog.

It may be mixed with butter or given as pill with syrup or treacle or in a gelatine capsule.

Any powdered drugs prescribed for dogs in pill form in the previous recipes may be given as powders, thrown upon the tongue, but not such as provoke nausea —for instance, aloes. They would be lost, and must therefore be employed as pills, preferably as capsules or as drenches.

POWDERS FOR ECZEMA.

Saccharated Carbonate of Iron	5 to 10 Grains
Flowers of Sulphur	5 Grains
Arsenious Acid	⅛ Grain
Sugar	3 Grains

Mix. Throw on the tongue daily.

Orris Root is often mixed with this as an agreeable flavoring, but has no medicinal action. See Ointments for Eczema.

Medicines for Cats.

Those who have had most to do with the medical treatment of cats are the first to confess their ignorance of the effect of drugs. The one thing to be avoided is nauseating a cat, as she will retire to a corner and dribble saliva for hours and even days, and in some cases never take food again. The remedies prescribed for dogs may be tried in doses proportioned to the size of the animal, and if possible given in a tiny capsule. A compound rhubarb pill is a tolerably safe dose for indigestion. No carbolic or coal tar derivatives must be employed internally or as outward applications, or the cat is liable to absorb the poison and die. The writer caused the death of a valuable prize cat by washing it with a soft soap lotion containing a mere fraction of carbolic acid.

External Remedies.

Embrocations, liniments, lotions, ointments* and salves are among the oldest forms of medication for the allaying of pain, the restoration of function, the destruction of parasites, and the cure of diseases. Much depends upon their intelligent application. The liniment had almost gone out of use when the ancient practice of massage was revived. Oils, lard, vaseline, lanoline, spirit of wine and other things are used either as solvents of active principles, as diluents, or as affording a convenient medium, and one which lends itself to the particular method of application desired by the prescriber.

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* Isaiah i. 6—"Neither mollified it with ointment."

Oils and unguents permit of long and persistent rubbing in. Spirits may be advised for their evaporating qualities, or merely as solvents of active principles which neither water nor oil will extract, and which would decompose in the former if not in the latter. Evaporating lotions produce their effect by the cold induced; liniments of the stronger kinds by the opposite effect, and vary in their action from the rubefacient to the vesicant (reddening to blistering).

Hypodermic Medication.

The administration of drugs hypodermically, intravenously or intratracheally, offers many advantages in veterinary medication, particularly when administration by the mouth is inadvisable, as in acute abdominal pain, acute indigestion, enteritis, or impaction of the stomach or intestines, at which times but slight therapeutic action can be expected from oral administration owing to inadequate absorption. Drugs administered hypodermically enter the circulation unaltered by the ferments or secretions of the digestive canal; this method, therefore, gives prompt and reliable effects.

Except in emergency cases, it is best to give a small dose for the first injection.

Intravenous injection introduces the drug through the jugular vein directly into the blood stream. Solutions for this purpose should be diluted until non-irritant, the best diluent being a solution of sodium chloride: 15¾ grains of pure sodium chloride in four ounces of tepid, recently-boiled water. The injection should be made slowly, taking every precaution against clot formation, septic contamination, or the introduction of air.

Intratracheal injection is resorted to when the drug is considered too bulky to inject hypodermically.

Whichever method is used, every antiseptic precaution should be observed. The hair over the site of injection should be cut close or shaved, the part cleansed with antiseptic soap, and the needle rendered sterile by immersion in a solution of the soap during the preparation of the dose.

Solutions for injection are best prepared as required by dissolving hypodermic tablets in saline solution or recently-boiled water. Stock solutions are liable to contamination and deterioration.

P., D. & Co.'s Hypodermic Tablets are made under the most favorable conditions for excluding impurities. Every ingredient employed is of guaranteed purity, and the greatest care is exercised to ensure accuracy, perfect solubility and stability. Thanks to their compactness, the veterinary surgeon can carry in his pocket a selection of drugs adapted for almost every emergency, in a case which is of little weight or bulk, and is strong enough to preclude all risk of breakage.

The following selection of tablets includes those in most frequent use in veterinary practice:

Aconitine (crystalline), 1/40 grain, 1/30 grain and 1/20 grain (standardized physiologically).

Aconitine is a powerful sedative, febrifuge, diaphoretic, diuretic and narcotic. Early doses are specially useful in sthenic fevers and acute inflammation, as pleurisy, peritonitis, pneumonia, enteritis, lymphangitis, laminitis, mammitis, etc. Its extreme toxicity demands caution in use. It is contraindicated in cardiac affections.

Dose for horses and cattle, 1/40 to 1/20 grain.

Adrenalin, 1/65 grain and 1/200 grain.

Adrenalin is a most powerful cardiac stimulant, constringent and ischemic. When injected with local anesthetics it reduces hemorrhage during operations and gives a clearer view of the field of operation.

Hypodermic injections of dilute Adrenalin Solution (six to eight of the 1/65 grain tablets in one ounce of saline solution) are reported to cure epistaxis in race-horses and to prevent its occurrence during severe exertion in the case of known "bleeders."

In purpura, repeated intravenous injections of a very dilute solution raise blood pressure and diminish the extravasation.

In red-water of cattle, injecting a solution of three tablets (each 1/65 grain) in one ounce of saline solution, repeated after a few hours, causes prompt improvement and eventual recovery.

In milk fever, it is reported that eight of the tablets (each 1/65 grain) in one ounce of saline solution injected subcutaneously and repeated in twelve hours, caused immediate improvement and rapid recovery.

In azoturia of horses, from two to four of the tablets (1/65 grain) in 1½ ounces of saline solution should be administered as soon as possible. The drug appears to have specific curative effect in this disorder.

In collapse following upon injuries, etc., Adrenalin is the most powerful restorative available; it should be given by slow intravenous injection, greatly diluted with normal saline solution.

In laminitis, 1/100 grain (two of the 1/200 grain tablets) in 100 minims of saline solution, injected into the fetlocks (both inside and outside) daily, cause absorption of the exudate from the hoof capsule, and a cure soon results.

The solution of these tablets has many valuable applications when used topically, as in various congestions of the nose and eyes, and in uterine and other hemorrhages.

Doses—For horses and cattle, from 2 to 8 of the 1/65 grain tablets; for sheep, 2 to 5 of the 1/200 grain tablets; for dogs, from 1 to 2 of the 1/200 grain tablets, dissolved in not less than 10,000 times their weight of normal saline solution.

ADRENALIN and COCAINE.

These tablets are made in two strengths, ℞ "A" and ℞ "B." One of the former dissolved in 9 minims, and one of the latter in 38 minims of normal saline solution will yield 2 per cent. solutions of cocaine, though in the first instance the adrenalin strength is about 1 in 3,000, and in the second about 1 in 15,000.

These solutions are much employed by hypodermic injection for infiltration anesthesia preparatory to operations such as neurectomy, herniotomy, tracheotomy, firing, removing tumors, etc. They also furnish a valuable means of discovering the source of lameness, by injecting into the area where the cause is suspected to lie; if the animal then goes sound during the period of anesthesia thus induced, the diagnosis is confirmed.

ADRENALIN and EUCAINE.

The anesthetic action of eucaine (see note on Beta-Eucaine Hydrochloride) is intensified by injecting adrenalin with it. These tablets afford a ready means of making fresh sterile and active solutions for providing anesthesia and ischemia during surgical operations. For small operations, the strength usually employed is one tablet in 17 minims of cold, recently boiled distilled water, and when the field to be anesthetized is more extensive, six tablets are dissolved in one ounce of water. These solutions give excellent results in the removal of tumors and cysts, opening up sinuses and abscesses, castration, herniotomy, tracheotomy, neurectomy, amputation, etc.

APOMORPHINE HYDROCHLORIDE, 1/20 grain and 1/10 grain.

Apomorphine is a sure and prompt emetic for dogs in doses of 1/30 to 1/10 grain. In acute bronchitis of dogs, mild emetic doses are useful in the first stage and also in the later stage to expel indurated mucus. In doses of 1/40 to 1/25 grain it is valuable for rendering secretion less viscid in chronic dry bronchitis of dogs. It is reported to be curative in cases of pica, cattle being given doses of 2 grains on three successive days, and foals from 1 to 3 grains every four or eight days.

Arecaline Hydrobromide, ½ grain.

Arecaline hydrobromide is a powerful sialagogue, diaphoretic, intestinal stimulant and vermifuge. It promotes peristalsis and hastens evacuation of the intestinal contents. Its action is somewhat allied to that of pilocarpine, but of shorter duration. It is valuable in the treatment of acute indigestion, impaction, laminitis, azoturia, and tympanites.

Dose for horses and cattle, ½ to 1½ grains.

In a discussion on "Colic" (*Veterinary Record*, Feb. 29, 1908), one speaker stated that he found this drug very satisfactory, though at first the copious salivation it induces rather alarmed him. In the *Veterinary News* of March 18, 1907, four cases of impaction and tympanites are reported in which one grain of arecaline, hypodermically, caused prompt evacuation of feces and flatus.

Atropine Sulphate, ¼ and ½ grain.

Atropine is a cardiac and respiratory stimulant, anodyne, antispasmodic and mydriatic. Useful in catarrh, pharyngitis, laryngitis, bronchitis, and influenza. May be injected in cases of obstruction of the œsophagus to overcome spasm and release the foreign substance (*Veterinary Record*, Oct. 13, 1906, page 221).

Dose—For horses and cattle, 1/10 to ½ grain; for a dog, 1/200 to 1/100 grain.

Barium Chloride Compound.

Barium Chloride	7 Grains
Digitalin	1/12 Grain

Barium chloride, when injected intravenously, stimulates peristalsis, promptly producing evacuations, which may be continued for some hours. Digitalin is added to counteract depressing effects. The use of barium chloride compound is indicated in those disorders for which arecaline hydrobromide is employed, but it must be administered intravenously. Barium chloride is a nerve poison, and a second dose should not be given within twelve hours of the first.

Dose for horses and cattle: one tablet injected intravenously.

Beta-Eucaine Hydrochloride, ¼ grain.

A local anesthetic, whose action is not quite so prompt as that of cocaine, but is more enduring and less likely to produce toxic effects. It is specially useful for operations on dogs, for which purpose four of the ¼ grain tablets may be dissolved in from 15 to 25 minims of sterile water, according to the degree of anesthesia required. By the addition of adrenalin the analgesic power of the drug is intensified and hemorrhage is also lessened; thus, one tablet in 25 minims of sterile water with one drop of 1:1000 solution of adrenalin chloride added, is generally satisfactory for small operations.

Caffeine Sodio-Salicylate (representing caffeine), ½ grain.

Caffeine is a diuretic and cardiac stimulant. Of value in canine dropsy, also to aid the absorption of pleuritic effusion. Used to support the heart in acute, asthenic diseases, such as distemper, also as an antidote to opium or morphine.

Dose for a dog, ½ to 3 grains.

Cardiac Tonic.

Digitalin	1/10 Grain
Sparteine Sulphate	⅕ Grain
Strychnine Nitrate	⅛ Grain

A valuable combination, which diminishes the frequency and increases the force of the heart's action. Specially indicated in low fevers with great debility, as influenza, pink-eye, cellulitis, dropsy, purpura, etc.

Dose for horses and cattle, 1 tablet.

Cocaine Hydrochloride, 1 grain and 2 grains.

Convenient for making solutions of any desired strength. A 1-grain tablet dissolved in 109 minims of distilled water provides a 1 per cent. solution; in 54 minims, 2 per cent.; in 36 minims, 3 per cent.; in 26 minims, 4 per cent.; in 21 minims, 5 per cent.; and in 10 minims, 10 per cent.

Codeine, ⅛ grain.

Codeine is a respiratory and gastric sedative, useful in asthma and bronchitis of dogs, also in gastrodynia and gastric ulcer. It is slightly narcotic.

Dose for a dog, ¼ to 2 grains.

Colchicine, ¼ grain and ½ grain.

The cathartic, diuretic and diaphoretic properties of colchicine render it of value in the elimination of effete matter. It is given in rheumatic affections.

Dose—For horses and cattle, ⅙ to ½ grain; for dogs, 1/120 to 1/50 grain.

Colic.

Morphine Sulphate	2 Grains
Atropine Sulphate	¼ Grain
Aconitine (crystalline)	1/40 Grain

Valuable in correcting derangements of the digestive tract.

Dose for a horse, 1 tablet.

Coniine Hydrobromide, 1 grain.

Particularly useful in spasmodic cough with muscular irritability, met with in epizoötic sore-throat, bronchitis, etc. A powerful sedative. Excessive doses produce motor paralysis.

Dose for horses and cattle, ½ to 1½ grains; sheep and pigs, ⅕ to ⅖ grain; dogs, 1/60 to 1/30 grain.

Digitalin (pure German), ⅛ grain and ¼ grain.

Digitalin is a cardiac tonic and diuretic. It is indicated in mitral insufficiency, palpitation and dropsical conditions.

Dose for horses and cattle, ¼ grain; dogs, 1/60 to 1/30 grain.

HYOSCYAMINE (pure), ⅛ grain.

Hyoscyamine is an anodyne, antispasmodic and deliriant narcotic. It is chiefly employed to relieve pain and allay nervous or muscular excitement.

Dose for a horse, ⅛ to ½ grain; for a dog, 1/100 to 1/50 grain.

MORPHINE SULPHATE, 1 grain and 2 grains

Sedative, antispasmodic narcotic.

Dose for horses or cattle, 2 to 4 grains; sheep, ½ to 1 grain; dogs, ⅛ to ¼ grain.

MORPHINE AND ATROPINE.

(No. 1.)

Morphine Sulphate	1½ Grains
Atropine Sulphate	½ Grain

Dose for horses or cattle, 1 to 2 tablets.

(No. 2.)

Morphine Sulphate	1½ Grains
Atropine Sulphate	¼ Grain

The constipation and nausea which often follow the hypodermic injection of morphine are less likely to occur if atropine be added to each dose, whilst the sedative action is enhanced.

Dose for horses or cattle, 1 to 2 tablets.

NITROGLYCERIN, 1/10 grain.

Nitroglycerin dilates the arterioles, reducing blood pressure, and promotes diaphoresis and diuresis. It is chiefly employed in spasmodic affections of the respiratory apparatus and in nephritis.

Dose for horses or cattle, ¼ to ½ grain; for dogs, 1/100 to 1/50 grain.

PHYSOSTIGMINE SALICYLATE, ¼ grain, ½ grain, 1 grain, and 1½ grains.

Physostigmine (eserine) is a gastric, intestinal and hepatic stimulant. It increases peristalsis and is indicated in intestinal obstruction depending upon impaction of the colon, with a paralyzed condition of the walls of that viscus, but is contraindicated in obstructions due to inflammatory conditions. It is not used in canine practice.

Dose for horses and cattle, 1 to 2 grains.

PHYSOSTIGMINE COMPOUND.

Physostigmine Salicylate	¼ Grain
Pilocarpine Hydrochloride	½ Grain
Strychnine Sulphate	⅛ Grain

Increases gastric and intestinal secretions, stimulates peristalsis, and possesses a tonic action. Indicated in intestinal obstructions (see preceding note).

Dose for horses and cattle, 1 to 2 tablets.

Physostigmine and Pilocarpine.

Physostigmine Salicylate	½ Grain
Pilocarpine Hydrochloride	1 Grain

The characteristic action of physostigmine upon the muscular coats of the stomach and intestines is greatly enhanced by the addition of pilocarpine. In a discussion on "Colic" (*Veterinary Record*, Feb. 29, 1908), one speaker stated that the combination of physostigmine and pilocarpine was most effective. He advocated intravenous administration as giving the quickest and surest results.

Dose for horses and cattle, 1 to 2 tablets.

Pilocarpine Hydrochloride, ½ grain and 1½ grains.

Pilocarpine is a powerful expectorant and sialagogue. It is used in dropsy, and is believed to increase intestinal secretions.

Dose for a horse, 2 to 3 grains; for a dog, 1/20 to ⅓ grain.

Sodium Arsenite, 1 grain.

Sodium arsenite is alterative and tonic, useful in skin affections and nervous disorders.

Dose for a horse, 1 to 3 grains.

Strychnine Sulphate, ¼ grain, ½ grain and 1 grain.

Valuable in general and local paralysis, and as a cardiac or general tonic.

Dose for horses and cattle, ¼ to 1 grain.

Veratrine Hydrochloride, ¼ grain and ½ grain.

Veratrine possesses febrifuge and anodyne properties, and is useful in such febrile diseases as acute pneumonia, pleurisy, laminitis, peritonitis and rheumatism. Its administration requires extreme caution

Dose for a horse, ½ to 1 grain.

Embrocations or Liniments.

A thick ammonia liniment or embrocation often called white oils and farriers' oils is made by shaking together.

Liquid Ammonia	1 Ounce
Almond Oil	1 Ounce
Olive Oil	2 Ounces

This is similar to the old hartshorn and oil, but an improvement upon it.

White Oils.

Olive Oil	3 Ounces
Almond Oil	1 Ounce
Spirit of Turpentine	1 Ounce
Liquid Ammonia	1 Ounce

Shake the oils and ammonia together, and add the turpentine slowly, with additional agitation.

Spirit of Turpentine	3 Ounces
Oil of Thyme	1½ Ounces
Yolks of Two Hens' Eggs.	
Liquid Ammonia	3 Ounces
Vinegar	1 Pint

Whip the eggs, the oils, and ammonia together, and add the vinegar little by little, with much agitation.

Camphor Flowers	1 Ounce
Acetic Acid	15 Ounces
Alcohol (90 per cent)	18 Ounces
Oil of Turpentine	51 Ounces
Six Eggs	
Distilled Water	45 Ounces

Dissolve the camphor in the spirit: whip the eggs and turpentine together, add the acid slowly and with agitation, and lastly the water.

Soap Liniment.

Soft Soap	2 Ounces
Liquid Ammonia	2 Drams
Oil of Rosemary	1 Dram
Methylated Spirit	8 Ounces

Rub the soap and rosemary together in a mortar, and add the ammonia, and lastly the spirit.

Iodine Liniment.

Iodine Crystals	1 Dram
Iodide of Potassium	1 Dram
Methylated Spirit	3 Ounces

Dissolve in the spirit.

Cracked Heels and Mud Fever.

Strong Solution of Subacetate of Lead	1 Part
Linseed Oil	7 Parts
Creosote	1/200 Part

Shake.

Sprains or Strains.

Aconite Liniment	1 Part
Belladonna	1 Part
Soap Liniment	6 Parts

Mix.

Liniment for Thrush and Canker.

Sulphuric Acid (Oil of Vitriol)	4 Drams
Linseed Oil	2½ Ounces
Venice Turpentine	6 Ounces
Stockholm Tar	4½ Ounces

Mix the oil, tar, and turpentine in a jar, in a saucepan of hot water, and melt together; lastly, add the acid and stir well. This should be done in the open, as the fumes are unhealthy.

Mange Liniment.

Spirit of Turpentine	1 Part
Creosote	1 Part
Seed Oil	12 Parts

Mix.

To be applied to small areas only.

Sulphur Flowers	4 Ounces
Turpentine	2 Ounces
Oil of Tar	2 Ounces
Train Oil	10 Ounces

Mix. Shake before using.

Foot Rot Liniments.

Butyr. of Antimony	1 Part
Spirit of Tar	5 Parts

Mix.

Burn Alum Sulphate of Copper } of each	1 Part
Spirit of Tar	2 Parts

Mix. Shake.

Sweating Liniments.

These act as mild blisters and are frequently used for horses which cannot be rested.

1.	Spanish Flies	1 Ounce
	Methylated Spirit	8 Ounces

Digest the powdered flies in the spirit for a week, shaking daily. Apply once and repeat in three days if a scurf is not raised.

2.	Oil of Turpentine	1 Part
	Olive Oil	2 Parts

3.	Oil of Turpentine	1 Part
	Linseed Oil	1 Part

4.	Tincture of Cantharides	1 Part
	Soap Liniment	5 Parts

Mix.

5.	Tincture of Iodine	1 Part
	Glycerine	2 Parts

Mix.

Very mild; suited for knee and joint swellings.

Liniment for Splints (Sweating).

Croton Oil	1 Ounce
Oil of Mustard	1 Ounce
Oil of Turpentine	1 Ounce
Olive Oil	1 Ounce

Mix.

Blisters.

These are commonly made up with lard or vaseline for convenience of application, lending themselves to the rubbing in business better than the mild vesicants or liquid blisters which have been called sweating liniments or embrocations, which see.

Strong Blister.

Biniodide of Mercury	1 Part by weight
Venice Turpentine	1 Part by weight
Lard or Vaseline	6 Parts by weight

Medium Strength.

For general use, as on splints, spavins and ringbones of any but very coarse-skinned animals.

Red Iodide of Mercury	1 Part
Lard or Vaseline	8 Parts

Mix.

Mild Blister.

For use at short intervals.

Biniodide of Mercury	1 Part
Lard	12 to 16 Parts

Mix.

Fly Blister.

Spanish Flies (powdered)	1 Ounce
Methylated Spirit	6 Ounces
Hartshorn Liquid	2 Ounces

Digest the flies in the spirit for a week, shaking daily. Add the ammonia. Fly blisters have been almost superseded by biniodide of mercury.

Ointments.

The most frequently used ointment is that known as digestive or yellow basilicon, and is suited to indolent wounds and to draw matter. It is mixed with poultices for pricked feet and foul in cattle.

Resin in Powder	8 Parts by weight
Beeswax	8 Parts by weight
Olive Oil	8 Parts by weight
Lard	6 Parts by weight

Melt together at a low heat and stir until cold.

Green Castrator's Ointment.

Verdigris	1 Ounce
Venice Turpentine	3 Ounces
Lard	9 Ounces

Melt together at a low heat.

Antiseptic and Healing Ointment.

For sores and abrasions, cracked heels and irritable skins:

Pure Carbolic Acid	15 Drops
Oxide of Zinc	1 Dram
Benzoated Lard	1 Ounce

Mix.

A stronger one for old cracks in the heels may be made as follows:

Finely Powdered Acetate of Copper	1 Ounce
Digestive Ointment	1 Ounce
Vaseline	6 Ounces

Mix.

For Saddle and Harness Galls and Sitfasts:

Carbolic Acid	1 Dram
Fuller's Earth	2 Drams
Glycerine	2 Drams
Lard	1½ Ounces

Mix.

Tar Ointment.

For Fly-blow, and as a protection against maggots:

Stockholm Tar	5 Ounces
Beeswax	4 Ounces

Melt together at a low heat.

Iodine Ointment.

For Actinomycosis of the udders of sows and for glandular swellings and inflamed bursæ:

Iodine	2 Drams
Iodide of Potassium	2 Drams
Lard	12 Drams

Mix.

LICE OINTMENT.

For dogs and cats where coal-tar preparations are not safe:

Stavesacre Seeds, crushed	2 Ounces
Beeswax	1 Ounce
Lard	9 Ounces

Heat the stavesacre with the lard for two hours, strain, and add the wax, melting together and stirring until cold.

SULPHUR OINTMENT.

Flowers of Sulphur	1 Part
Olive Oil	1 Part
Lard	7 Parts

Mix.

For mange and ringworm:

STRONGER SULPHUR COMPOUND OINTMENT.

Salts of Tartar	1 Ounce
Sulphur	1 Ounce
Spirit of Tar	1 Ounce
Lard	5 Ounces

Mix.

For white flaw or crusted ringworm on calves:

OINTMENT FOR CUP RINGWORM (FAVUS).

Ointment of Nitrate of Mercury	1 Part
Iodine Ointment	1 Part

Mix.

EAR CANKER OINTMENT.

For Dogs:

Ointment of Nitrate of Mercury	1 Part
Lanoline Ointment	30 Parts

Mix.

COCAINE OINTMENT.

Cocaine	10 Grains
Lard	90 Grains

Mix.

Plasters or Charges.

These are applied for strengthening strained parts and for reducing swellings, such as bog spavin. They are put on warm and covered with chopped tow or fleece to prevent straws and other things from adhering.

Olive or Linseed Oil	4 Ounces
Venice Turpentine	6 Ounces
Pitch	4 Pounds

Melt together.

Pitch	3 Pounds
Tar	1 Pound
Beeswax	9 Ounces

Melt together.

COLD CHARGE.

For strained sinews:

Bole	½ Pound

White of egg and vinegar to form a paste.

To be applied on cloth or leather.

BLISTER CHARGE.

For enlarged stifle joints:

Cantharides	1 Ounce
Pitch	1 Pound

Melt the pitch and stir in the powder and apply warm.

HOOF OINTMENTS.

These are used for brittle feet and as a protection against melted snow where salt is used in cities.

Linseed Oil	1 Part
Beeswax	1 Part
Lard	1 Part
Veal Suet	1 Part
Turpentine	1 Part
Stockholm Tar	3 Parts

Melt together at a gentle heat.

Beeswax	4 Ounces
Tar	9 Ounces
Russian Tallow	4 Pounds

Melt together at a low heat.

Ivory Black	1 Part
Tar	1 Part
Lard	6 Parts

Melt the lard and tar together, and stir in the ivory black while thin.

Lotions.

EYE LOTION.

For eye blights of infectious character:

Chinosol	10 Grains
Water	100 Drops

Drop into the eye twice a day.

Sulphate of Zinc	5 Grains
Distilled Water	1 Ounce

For films on eyes.

Cocaine Lotion.

For rendering the eye insensitive while seeking to remove foreign bodies:

Cocaine	7 Grains
Water	100 Drops

Cocaine Lotion for Firing.

Cocaine	10 Grains
Oil of Cloves	100 Drops

To be painted on the skin to be fired, ten minutes before operating.

For clouds on the eye:

Protargol	7 Grains
Rose Water	1 Ounce

Drop on the opacity.

Nitrate of Silver Lotion.

Silver Nitrate	2 Grains
Distilled Water	1 Ounce

Suitable for clouds on conjunctival membranes, but stains the face.

Evaporating or Cooling Lotions.

Menthol	1 Ounce
Methylated Spirit	30 Ounces

Nitre	2 Ounces
Ammonium Chloride	2 Ounces
Water	1 Quart

Dissolve and use immediately.

Vinegar	1 Pint
Sal Ammoniac	1 Pound
Nitre	3 Ounces
Water	2 Gallons

Grease Lotion.

For White Legs:

Zinc Sulphate	1 Pound
Water	1 Gallon

Chloride of Zinc	2½ Ounces
Water	2½ Pints

Sulphate of Zinc	½ Pound
Sulphate of Iron	½ Pound
Sulphate of Copper	½ Pound
Water	2 Gallons

A ten per cent. solution of chloride of zinc in water is used for grease, where grapelike growths are established.

Leg Lotions.

Sugar of Lead	1 Ounce
Tincture of Arnica	1 Ounce
Water	1 Quart

Apply on linen (not woolen) bandages.

Goulard's Extract	1 Ounce
Vinegar	10 Ounces
Water	20 Ounces

Mix.

Goulard Extract	4 Drams
Methylated Spirit	2 Ounces
Water	1 Pint

Mix.

Bay Salt	7 Ounces
Chloride of Ammonium	3 Ounces
Vinegar	1 Pint
Water	1 Pint

Mix.

Astringent Lotions.

For cracks and indolent sores about the heels:

Alum	4 Ounces
Boracic Acid	1 Ounce
Water	1 Quart

Mix.

Sulphate of Zinc	20 Grains
Alum	1 Dram
Sulphate of Iron	30 Grains
Water	1 Pint

Mix.

Wart Solvents or Lotions.

Salicylic Acid	1 Part by Measure
Collodion	7 Parts by Measure

Mix.

Potassium Hydroxide	27 Grains
Water	1 Ounce

Liquor Potassæ of the Pharmacopœia.

Chloride of Zinc	1 Ounce
Water	1 Ounce

Mix.

Mange Lotions.

Stavesacre	1 Pound
Water	2 Gallons

Boil together for two hours; strain and add a wineglass of kerosene, shaking before brushing into the skin.

Hellebore Root	2 Ounces
Tobacco	4 Ounces
Water	½ Gallon

Boil for an hour and strain.

Tobacco	1 Ounce
Boiling Water	1 Quart
Perchloride of Mercury	2 Drams

Infuse the tobacco; strain. Dissolve the mercury (sublimate) in the product.

Freshly Slaked Lime	1 Ounce
Flowers of Sulphur	5 Ounces
Water	2 Gallons

Boil together for half an hour; strain. Use the same day.

Soft Soap	½ Pound
Kerosene	½ Pint
Corrosive Sublimate	4 Drams
Warm Water	1½ Gallons

Dissolve the soap and the sublimate in separate portions of the water. Shake the soap solution and kerosene together; add the other solution.

Liver of Sulphur	½ Ounce
Molasses	1 Ounce
Water	1 Quart

Dissolve the sulphur and add the other ingredients.

Black Wash.

Calomel	2 Drams
Lime Water	1 Pint

Shake together.

For sluggish wounds, ulcers, etc.

Yellow Wash.

Perchloride of Mercury	10 Grains
Lime Water	6 Ounces

Shake together.

Chloride of Lime Wash.

Chlorinated Lime	1 Pound
Water	1 Gallon

Shake together in well-stoppered stone bottle. Diluted with fifteen to twenty parts, this is used as a mange lotion; also for foul tongue, ulcers, and thrush, and canker, and is a powerful disinfectant for drains and dead subjects.

Leg Mange Lotion.

Corrosive Sublimate	70 Grains
Spirit of Salts	3 Drams
Tobacco	1 Ounce
Water	3 Pints

Pour the water over the tobacco while boiling, and strain an hour later. Dissolve the sublimate and add the acid. Shake.

Lotion for Stopping Bleeding.

Alum	1 Ounce
Zinc Sulphate	20 Grains
Water	1 Quart

Oils.

There is a very general belief in preparations called "oils." They have the merit in the eyes of some for their number: thus "nine" oils and "seven" oils and "five" oils are popular, especially in the Old World, where things ancient are more venerated and less criticised. Leaving out the fudge connected with numbers, we place here a few of the really useful "oils" that may be desired, at the cost of the materials only, and without paying for some proprietor's name.

White Oils.

The formulæ for these have been given under Embrocations or Liniments.

Carron Oil.

Linseed Oil	equal parts.
Lime Water	

For burns and scalds. *Should be kept in every farmhouse for man and beast.*

Carbolic or Carbolized Oil.

Pure Carbolic Acid	4 Drams
Olive Oil	5½ Ounces

For wounds and burns and as an antiseptic dressing for hands before operations. Should be kept side by side with Carron Oil, where *every one* of the household *knows where to find it in an emergency.*

Black Oils.

Olive or Rape Oil	1 Pint
Oil of Turpentine	2 Ounces
Oil of Vitriol	6 Drams

Mix the two first and add the oil of vitriol gradually, stirring with a glass rod in the open air.

DRIFFIELD OILS.

Spirit of Turpentine	5 Ounces
Linseed Oil	15 Ounces
Oil of Vitriol	1¼ Ounces
Water	1 Pint
Spirit of Tar	1 Pint

This must be mixed *secundum artem,* or it will boil over and scald the maker. First mix the turpentine and linseed oil in a large earthenware jar; add the oil of vitriol slowly, stirring, but avoiding the fumes. After standing a whole day add the water and lastly the spirit of tar. It will be seen by comparison with the foregoing recipe that the active ingredients are the same.

DEVONSHIRE OILS.

Many recipes exist for the preparation of these oils, which are supposed to cure everything, inside and out. Camphor, laudanum, soft soap, and linseed oil are the chief constituents.

Miscellaneous.

CASTRATOR'S DRESSING POWDER FOR CAUSTIC CLAMS.

Corrosive Sublimate	2 Drams
Red Precipitate Powder	2 Drams
Powdered Gum Arabic	6 Drams

Mix.

ARSENIC PASTE FOR WARTS.

Arsenious Acid	1 Ounce
Soft Soap	2 Ounces

Mix.

Poisons and Antidotes.

When cases of poisoning occur, they find owners unprepared, and in their bewilderment they too often use the wrong thing. It is no time to study the subject when a beast is *in extremis,* and he who would profit by this chapter should assimilate it at his leisure: or knowing just what poison he has to deal with, seek it in the list following, for which an antidote is named.

ACORN POISONING.—In oak districts this is a frequent trouble when early autumn storms bring down the unripe fruit. The subject has been investigated by European authorities with but little result. Labor is too dear for gathering acorns, and cattle are best driven off until swine and wood pigeons have made something of a clearance. Pigs may consume a fairly large number without injury, and ripe acorns kept until winter are quite a valuable food when given with linseed and other laxative substances.

The symptoms of acorn poisoning are those of impaction, or fardel bound, for the most part. The animal gets away from the herd and looks miserable. The ears droop, the head is held low, there is often a gruff—not quite a groan—at the end of each, or of alternate expirations. Constipation is marked, and presently a gummy discharge around the nostrils. The brain is affected, and the animal is either sleepy, as in stomach staggers (see pages 145 and 146), or paralyzed more or less and staggering in his walk. In a few cases delirium precedes death. More often the animal wastes slowly away. If recognized in time, a good dose of aloes and salts (see Physicking, at page 363), followed by small ones of linseed oil, enable the bowels to empty themselves. This may be followed by ounce doses of bicarbonate of potash, together with one or two drams of powdered nux vomica to impart nerve force. If the animal rallies on this treatment, some of the cordial digestive powders given in the list of recipes may be employed to restore appetite, digestion, and renewed assimilative power. Late cases do not pay for treatment.

YEW POISONING.—This is one of the mysteries still. Sometimes an ounce or two of fresh twigs will cause the death of horse or ox. Sometimes the picking over of withered loppings will have a fatal effect. At other times cattle and horses will browse on yew in either green or dried state, and appear to be none the worse. Some evanescent poison seems to be suggested by this curious circumstance.

Yew causes death by paralysis of the vital organs. Almost all the vegetable poisons to which animals have access are of this narcotic type, and the remedy—if indeed there is time to give any—consists in powerful heart stimulants, and keeping the beast moving lest he fall into a fatal lethargy. Ammonia and alcohol in its popular forms may be given in large and frequent doses. If the narcosis can be overcome, the animal is saved, as there are no lasting effects. Since people no longer fight with bows and arrows there is no need for the yew tree, which is more to be feared than the deadly upas tree, and those who do not farm their own land should object to yews on their landlords' property, or take an indemnification into their agreements.

In the following list of poisons and antidotes we are adopting the usual arrangement in works on materia medica:

Poisons.	Antidotes.
Ammonia gas	Vinegar vapor; chloride of lime thrown into the air
Charcoal fumes, marsh gas and coal gas	Fresh air; artificial respiration; first cold then hot water thrown over head and neck
Acids, as oil of vitriol, aquafortis (nitric acid), spirit of salts (hydrochloric acid), phosphoric acid	Carbonates of soda, potash, magnesia; chalk, wall plaster, milk, white of eggs, soap, olive or other fixed oil
Vegetable acids—acetic, oxalic, salt of lemon, citric, or tartaric acid	Carbonates of soda, magnesia or lime (chalk) or wall wash
Hydrocyanic acid (prussic) or cyanide of potassium	Ether; camphor in alcohol and water; atropine hypodermically; perchloride of iron, or sulphate, and magnesium sulphate; hot and cold water alternately thrown over the spine
Caustic alkalies (potash, soda, or ammonia)	Vinegar and water, lime juice or other weak acid; eggs, milk, oil; stimulants later
Aconite or monkshood	Alcoholic draughts, ammonia, atropine, digitalis; warm rugs
Acorns and rhododendron	Linseed oil, salines, and soft foods
Alcohol	Cold water over head; strong tea or coffee, camphor, ammonia
Anesthetics (chloroform, etc.)	Cold hose over the head and inside the ears; inhalation of ammonia; artificial respiration
Antimony	For animals which cannot obtain relief by vomiting, tannic or gallic acid in solution, milk, mucilage, bismuth

Poisons.	Antidotes.
Arsenic	Freshly prepared ferric chloride; stomach pump; eggs, milk, oils
Belladonna, henbane, hemlock	Alcohol, black coffee; artificial respiration; electricity
Cantharides (Spanish fly)	Gruel and barley water and white of eggs (no oily substances)
Carbolic acid, cresol, coal tars	Sulphate of sodium, magnesium, and calcium; stimulants to prevent collapse; no oil should be given, as it is a solvent and adds to the trouble
Croton oil	Gruel, barley water; stimulants
Chloral	Alcoholic stimulants; strong coffee, nux vomica or strychnine; clothing, bandaging, and friction to extremities
Cocaine	Inhalation of chloroform; chloral
Colchicum (autumn crocus)	Tannic and gallic acid; stimulants; barley water
Insect stings	Ammonia and oil; carbolic acid
Laburnum	Coffee, alcohol
Lead	Sulphuric acid dilute, sulphate of soda and magnesia, castor oil
Copper salts	Stomach pump; milk and white of egg, magnesia, treacle, soap, moist iron peroxide
Mercury salts	Olive oil; iodide potassium
Morphine, opium, and other narcotics	Stomach pump; hot strong coffee, alcohol, strychnine; cold water over head; move patient about
Phosphorus	Emetics, charcoal, turpentine, copper sulphate; no oil or fat
Quinine	Stimulants; coffee, gallic, tannic acid; artificial respiration

Poisons.	Antidotes.
Savin	Stimulants; ether; Epsom salts; demulcents
Snake bite	Tight ligature above injury; cut out portion; hot iron; caustics, ammonia or alcohol in large doses; artificial respiration
Strychnine or nux vomica	Inhale chloroform; tobacco internally; bromides of potassium or ammonium; tannic acid; emetics for dogs
Tobacco	Strychnine or nux vomica; alcohol; iodine in solution
Turpentine	Epsom salts; milk, eggs
Veratrine (hellebore)	Strong coffee, alcohol, tannic acid; opium
Yew	Ammonia, alcoholic stimulants; linseed oil; moving the patient about
Zinc salts	Emetics, white of eggs, barley water

INDEX

ABDOMINAL ASCITES, dropsy, 127
Abortion, infectious, 206
  picking, warping, slipping, slinking, miscarriage, 205
Abscess in the brain, 148
Abscess, serous, 286
Abscess of the throat, 84
Abscesses, boils, lumps, bumps, 285
Acari. *See* mange and scab, 273, 277
Accidents in stable, 370
Acidity of the vagina or uterus, 202
Acne, German measles, in horses, 291
Acorn poisoning, 475
Actinomycosis, wooden tongue, big jaw, 56
Actual cautery, the, 370
Acute indigestion, 92
Administration of medicines, 424-429
Adrenalin, 459
Aërial disinfection, 412
African horse sickness, South, 192
Albugo, clouds, nebulæ, spots on the eye, 382
Alcohol for the sick, 423
Amaurosis, glass eye, 386
Amputation of the penis, 197
Anæsthesia, 389-392, 416
Angleberries, warts, verrucæ, 270
Animals, disposal of dead, 413
Animation, suspended, 238
Anthrax, splenic fever, 12
Antidotes, poison, 476
Antiseptic, meaning of, 410
Antiseptics, disinfectants, 410
Aphtha, epizootic, 25
Aphtha, thrush, inflammation of the mouth, etc., 81
Aphrodisiacs, artificial stimulus to breeding, 202, 361
Apoplexy, heat apoplexy, sunstroke, 150
  parturient, 225
Arsenic paste for warts, 474
Ascarides, round and thread worms, nematoda, 400
Ascites, abdominal, dropsy, 127
Astringent balls, 435
Asthma, 180
Azoturia, hemoglobinuria, 23

BACK TENDONS, strain of the, 319
Bag, caked, hard bag, garget, mammitis, fall of the udder, etc., 231
Bain, 405
Balanitis, bull-burnt, clap, gonorrhea, 204
Balls for horses, 425, 426, 434, 436
  how to give, 425
Barbs, lampas, paps, congestion of the palate, 83
Barrenness and sterility, 202-205
Big head, osteoporosis, 17, 312
Big jaw, wooden tongue, etc., 56
Big leg, elephantiasis, lymphangitis, weed, etc., 30-32
Bitches, eclampsia in, 149
Bitches and sows, milk fever in, 229, 230
Bites and stings, 268
Black leg, blood struck, pook, quarter-ill, symptomatic anthrax, 15
Black water, red water, muir ill, hemoglobinuria, Texas fever, 20
Bladder, eversion of, or expulsion of, 136, 142, 224
  inflammation of, cystitis, 139
  stone in the, 140
Blast, blown, hoven, tympanitis, flatulent colic, 100-107
Bleeding, accidental, 393, 394
  after castration, 393
  after delivery, post-partum hemorrhage, 394
  arresting, 393
  from the nostrils, hemorrhage, 163
  general, 394
  hemorrhage, 393
  local, 394
  phlebotomy, 375
  systematic, bleeding from the lungs, hemoptysis, 180
  what to do in case of, 393-395
Blindness, moon, constitutional ophthalmia, 381
Blistering and firing, 365-367
Blistering precautions, 366, 367
Blisters, 466
Blocked gut, 117
Blood spavin, bone, bog, and, 308

Blood struck, black leg, pook, quarter-ill, symptomatic anthrax, 15
Blood, diseases of the, 11-58
Bloody urine, hematuria, 138
Blowing, high, 186, 187
Blown, blast, hoven, tympanitis, 100-107
Blue sickness, measles, red soldier, swine fever, hog cholera, etc., 50
Bog spavin, thorough-pin, 308-311, 326, 327
Boils, abscesses, bumps and lumps, 285
Bone spavin, 308
Bones, diseases of the, 304-337
  inflammation of the, 311, 320
Born, new-, troubles of, constipation, 238, 244
Bots, œstridæ, ox warble, 407
Bowel, rupture of the, burst gut, 116
Bowels, inflammation of the, enteritis, 113
Brain, abscess in the, 148
  diseases of the, 144-158
  tumors in the skull and, 153, 154
Bran mash, to make, 421
Bran mash and linseed, 421
Braxy, louping-ill, 24
Bread, 422
Breeding, artificial stimulus to, aphrodisiacs, 202, 361
Brittle feet, 356
Broken bones, fractures, 314
Broken horns, 272, 273
Broken knees, 300
Broken teeth, 77
Broken wind, chronic emphysema, emphysema of the lungs, 181, 438
Bronchitis, chronic, 173
  chronic, in dogs, 170
  parasitic, hask, hoast, hoose, husk, 403
Brushing, cutting, overreaching, interfering, 335
Buildings, disinfection of, 411
Bull burnt, gonorrhea, clap, balanitis, 198, 204
Bumps, lumps, boils, abscesses, 285
Burning carcasses, 14
Burns and scalds, 266
Burst gut, ruptured intestine, 116
Burst liver, rupture of liver, 126

Caked bag, garget, mammitis, fall of the udder, etc., 231
Calculi, salivary, spittle stones, 87
Calculus, or stone in the bladder, 140
Calf-bed, falling of, coming out of the womb, eversion of the uterus, 220
Calving, dropping, before and after, 209, 224-226
Canker, external, 284
  of the foot, 346
Canker of the ears, 283
Capped hock, shoe boil, 329
Capped or enlarged knee, housemaid's knee, 329
Carbolic saturation, 207
Carbuncle of the coronary band, 355
Carditis, inflammation of the heart, 60
Care of the sick, 418, 419
Caries and necrosis, 311
Caries of teeth, 78
Castrating calves, 372
Castrating colts, 368
Castrating lambs, 372, 373
Castrating pigs, 373
Castration, 368-371
  by ligature, 371
Castrator's dressing powder for caustic clams, 474
Cat mange, 278
Cat medicines, 456
Catalepsy, epilepsy, fits, 148
Cataract, spots on the eye, 382, 384
Catarrh, common cold, running at the nose, 159, 160
  nasal (chronic), nasal gleet, 161, 162
Cats, physicking, 364, 456
Cattle, foul of the foot in, 344
  medicines, 449
  physicking, 364, 408
  plague, rinder-pest, 25
Cerebritis and meningitis, 145
Cerebro-spinal meningitis in horses, infectious, 157, 158
Cestoda tæniæ, tapeworm, 397
Chapped and cracked heels, 263
Charges blister, 468
Chest founder, hydrothorax, water on the chest, pleurisy, pleuritis, 183
Chlorine gas, 412
Chloroform, how to give, 390
  See anesthesia, 389
Choking, 88
Chorea, St. Vitus's dance, shivering, stringhalt, 149, 150
Chronic bronchitis, 173
  in dogs, 170
Chronic and acute indigestion, 92, 95
Chronic emphysema, broken wind, 181
Chronic inflammation of liver, 124
Chronic ostitis, 311
Chronic running at nose, nasal gleet, 161, 162
Cirrhosis, chronic inflammation of the liver, 124
Clap, balanitis, bull-burnt, gonorrhea, 198, 204
Clean cut or incised wounds, 295
Cleansing, not, 219
Clothing the sick, 419
Cloudy spots on the eye, nebulæ, clouds, albugo, 382

Clysters, enemas, 428
Coathe, bain, bot in sheep, the rot, liver rot, 405
Cocaine, 442, 459
Colic, flatulent, 104, 444
  gripes, fret, 100
Coming out of womb, falling of the calf-bed, 220
Common cold, catarrh, running at the nose, 159-161
Composition of milks, 242
Conditioning, 359-362
Condition balls, 435
Condition, show, 361
Congestion of the liver, 120
Congestion of the lungs, 174
Congestion of the palate, 83
Conjunctivitis, ophthalmia, simple inflammation, 379, 381
Constipation, 107
  troubles of the new-born, 244
Constitutional diseases, 188-192
Constitutional ophthalmia, moon blindness, 381
Constriction, 201
Consumption, tuberculosis, 40
Contagious diseases, 191
Control, methods of, 413
Contused wounds, 295-297
Cord in dogs, inflammation of the, 156
Cornea, ulceration of, ulceration of the eyes, 382
Corns, 341
Coronet, inflammation of the, or villitis, 355
Cough balls, 437
Coughs, various, 186
Cow-kicking, 416
Cow-pox, the pock, vaccinia, 254, 255
Cracked heels, sprayed skin, scratches, 263
Cremation of heavy animals, 14
Crib biting, 152
Cripples, crockles, rheumatism, 54, 189
Curb, 334
Cut foot, pricked or, 347
Cutting, brushing, overreaching, interfering, 335
Cystitis, inflammation of the bladder, 139

Dance, St. Vitus's, chorea, shivering, stringhalt, 149, 150
Dead animals, disposal of, 413
Decay of teeth, 78
Defects and diseases of the new-born, 238-250
Deformity and soft feet, 244
Degeneration, fatty, 125
Dentition, 67-74
  of the horse, ox, pig and sheep, 67-74
Destroying carcases by fire, 14
Diabetes, polyuria, profuse staling, 137, 438
Diagnosis of diseases, 1-5
  of lameness, 5-10
Diaphragm, spasm of, 138
Diarrhea, 109
  purging, superpurgation, 111
Digestive system, diseases of the, 64-132
Dilated heart, hypertrophy, etc., 60
Discharges from the body, disinfection of, 411
Disease, Johne's, 46
Diseased ovaries, 203
Diseases and irregularities of the teeth, 75
Diseases, connected with parturition, 200-208
  and defects of the new-born, 238-250
  constitutional, 188-192
  of the blood, 11-58
  of the bones, 304-337
  of the brain, 144-158
  of the digestive system, 64-66
  of the eye, glaucoma, 379-392
  of the foot, 338-358
  of the female organs of reproduction, 199-237
  of the generative organs, reproductive, 193-199
  of the heart and blood-vessels, 59-63
  of the hock, 328-332
  of the kidneys, 133-138
  of the larynx, 164
  of the lips, 79-81
  of the liver, 119
  of the mouth, 86
  of the nervous system, 144-158
  of the respiratory organs, 159-187
  of the skin, 251-303
  of the urinary apparatus, 133
Disinfectants, function of, 410
  meaning of, 410
Disinfecting old buildings, 411
Disinfection, aërial, 412
  by fire, 412
  by gases, 412
  of clothes, 412
  of discharges, 411
  of drains, 410
  of floors, 411, 412
  of premises, 411, 412
  of stables, 411, 412
  of stable fittings, 411, 412
  of wooden mangers, 411
Dislocation of the eyeball, 388
Disposal of dead animals, 413
Docking horses, 377
Docking lambs, 378
Dog influenza, 34

Dog, madness in, rabies, hydrophobia, 35
Dog mange, 278
Dog medicines, 454
Dogs, chronic bronchitis in, 170
  inflammation of the cord in, 156
  physicking of, 364, 454
  rheumatism of, 54, 55
Dose tables, 431-433
Dourine, 191
Draughts or drenches, 443, 450
Drenches, drinks, 426, 450
Drenching, 426
Dressing a blistered limb, 367
Dribbling, slavering, slobbering, quidding, 81
Drop, the, 225
Dropping after calving, the drop, milk fever in cows, parturient apoplexy, 225-227
Dropping before calving, 224
Dropsical bursæ, windgalls, 333
Dropsical heart, heart water, pericarditis, 61
Dropsy, of the belly, abdominal, ascites, 127
  of the joints, 326
  of the sheath, swelled sheath, 196
Ducts, open, 86
Dumb rabies, 38
Dysentery, 112

Ear, fistula of the, 294
Ears, canker of, 283
  itching, 294
Eclampsia in bitches, milk fever, 149
Eczema, 258
  impetiginodes, grease, 261
  pustulosum, 261
Edema of the sheath, 196
Eggs and milk, meat, 422
Elbow lameness, 329
Electuaries, 427, 442
Elephantiasis, big leg, lymphangitis, weed, shake, farcy, 30-32
Embrocations or liniments, 463
Embryotomy, 217, 218
Emphysema, chronic, broken wind, 181
Enclosure of penis, phymosis, 193
Endocarditis, heart water, 61
Enemas, clysters, 428
Enlarged heart, hypertrophy, 60
Enlarged navel, ruptured navel, umbilical hernia, 246
Enteritis, inflammation of the bowels, 113
Epilepsy, catalepsy, fits, 148
Epizootic aphtha, 25
Epizootic lymphangitis, 30, 190, 192
Erythema, mud fever, 253, 264, 265
Eucaine, 459
Eversion or expulsion of bladder, 136, 142, 224
Eversion of the rectum, 119
Eversion of the uterus, coming out of the womb, fall of the calf-bed, 220
Excoriations, 254
Excrescences. 265, 266
External canker, 284
External remedies, 456
Eye, diseases of the humors of, 384
  diseases of nerves of, 379-392
  grape on the, staphyloma, 383
  spots on the, cataract, 382, 384
  worms in the, 388
Eyeball, dislocation of the, 388
Eyelids, malposition of the, 387
  sore, 387
  warts, etc., upon, 387
  wounds of, 388
Eyes, ulceration of the cornea, 382

Fall of the udder, garget, mammitis, mastitis, caked bag, hard bag, 231
Falling of the calf-bed, coming out of the womb, eversion of the uterus, 220
False quarter, 343
Farcy, fassy, fass, glanders, 27
Fatty liver, fatty degeneration, 125
Favus, honeycomb ringworm, 280
Febra pyogenica, strangles, 47
Feet, brittle, 356
Female organs of reproduction, diseases of, 199-237
Fermented liquors, etc., 422
Fetlock, overshot, or luxation, 320, 323
Fever balls, 439
Fever in the feet, parturient laminitis, 230, 349
  laminitis, 349
Fever, milk, in sows and bitches, 229, 230
  milk, eclampsia in bitches, 149
  mud, erythema, 253, 265
  swine, blue sickness, measles, red soldier, hog cholera, etc., 50
Firing, 365
Fistula of the ear, 294
Fistula of the parotid duct, 86
Fistulous withers, 289
Fits, catalepsy, epilepsy, 148
  after parturition, eclampsia, 149
Flatulent colic, 104-107, 444
Flaw, the, white flaw, ringworm, 279
Fleas, lice, ticks, 282
Flooding, bleeding after delivery, post-partum hemorrhage, 394
Fluke, liver rot worms, 405, 451
Fluke worms, trematoda, 405, 451
Fly maggots, sheep fly, struck with the fly, 280
Foaling, 209

Foot, pricked, 347
  and mouth disease, 358
  and mouth disease, murrain, epizootic aphtha, 25
  diseases of, 338-358
  rot in sheep, 357
Foul of the foot, foul, loo, low, 344
Founder, fever in the feet, laminitis, 349
Fractured teeth, 77
Fractures, knee, 300
  broken bones, 314
Fret, colic, gripes, 100
Frost bites, 266
Fundamental bots, 407

Gall-stones, 139
Galls, saddle and harness, 287
Garget, mammitis, fall of the udder, caked bag, 231
Gastritis, inflammation of the stomach, 97
  chronic, 99
Generative organs, diseases of, 199-237
German measles, acne, 291
Gid, sturdy, turnsick, etc., 146, 147
Giddiness, staggers, vertigo, megrims, 146, 147
Giving a ball, 425
Giving medicine to swine, 427
Glanders, farcy, fassy, fass, 27
Glass eye, amaurosis, 386
Glaucoma, diseases of the eye, 384
Gleet, nasal, running at the nose, nasal catarrh, 161, 162
Glossanthrax, 12
Glossitis, inflammation of the tongue, 82
Gonorrhea, bull-burnt, clap, balanitis, 198, 204
Grape on the eye, staphyloma, 383
Grease, eczema, impetiginodes, eczema pustulosum, 261
Gripes, colic, fret, 100
Grogginess, navicular disease, shoulder tied, 353
Gruel, how to make, 421
Grunting, 160, 161
Gut, bursted, 116, 117
  twisted, strangulated hernia, 129

Hard bag, garget, mammitis, fall of the udder, caked bag, etc., 231
Harness galls, 287
Hask, hoose, hoast, parasitic bronchitis, 403
Heart, diseases of, 59-63
  enlarged, hypertrophy, 60
  inflammation of, 60
Heart water, pericarditis, dropsical heart, 61
Heat apoplexy, 150, 152
Heat stroke, sunstroke, 150, 152
Heels, chapped and cracked, 263
Hematuria, bloody urine, 138
Hemoglobinuria, azoturia, 20, 23
Hemoptysis, bleeding from the lungs, 180
Hemorrhage, bleeding, 393
Hemorrhage, bleeding from the nose, 163
Hemorrhage, internal, 394
Hemorrhage, postpartum flooding, 394
Hemorrhoids, piles, 394
Hepatitis, inflammation of liver, 123
Hernia, strangulated, twisted gut, 129
  umbilical, 246
High blowing, 186, 187
Hip-joint lameness, 321
Hips, knocked down, 317
Hoast, husk, hoose, hasse, parasitic bronchitis, 403
Hobbles, 414
  of rope, 414
Hock, capped, capped elbow, shoe boil, capped knee, 310, 329
  sprung, 310, 328
Hog cholera, blue sickness, measles, red soldier, swine fever, etc., 50
Honeycomb ringworm, favus, 280
Hoose, hasse, hoast, husk, parasitic bronchitis, 403
Horn irregularities and troubles, 272
Horn tumors, 356
Horse, dentition of the, 67
  medicines, 424-429
  powders, 445
  pox, the pock, vaccinia, 254, 256
  sickness, South African perreziekte, etc., 192
Horses, German measles in, 291
  infectious cerebro-spinal meningitis in, 157, 158
  methods of control, 413
  prepared for physicking, 363
Housemaid's knee, capped knee, 329
Hoven, blown, blast, tympanitis, 100-107
Husk, hask, hoose, hoast, parasitic bronchitis, 403
Hydrophobia, madness in dogs, rabies, 36
Hydrothorax, chest founder, pleurisy, water on chest, 183
Hypertrophy, or dilated heart, 60
Hypodermic injections, syringe, 19, 457

Icterus, jaundice, the yellows, 122
Impetiginodes, grease, or eczema, 261
Incised wounds, clean cut or, 295
Incontinence of urine, or leaking, 136, 137
Indigestion, acute and chronic, 92
Infectious abortion, 206
Infectious and contagious diseases, 191

Infectious cerebro-spinal meningitis in horses, 157
Infectious gonorrhea, or bull-burnt, 204
Infectious skit, scour, white skit, 110, 249
Inflammation, of the bladder, cystitis, 139
  hepatitis, 123
  of joints, joint-ill, 249
  of navel, string, navel ill, 248
  of sesamoid bones, 320
  of spinal membranes, spinal meningitis, 154, 155
  of stomach, gastritis, 97-99
  of testicles, orchitis, 198
  of the bones, ostitis, 311
  of the bowels, 113
  of the coronet, or villitis, 355
  of the eyes, 379
  of the heart, carditis, 60
  of the heart membranes, 61
  of the kidneys, nephritis, 138
  of the knees, 329
  of the liver, chronic, 124
  of the lungs, pneumonia, 174, 177
  of the membranes of the cord in dogs, 156
  of the mouth, aphtha, thrush, 81
  of the parotid gland, parotitis, 86
  of the spinal cord, myelitis, 155
  of the throat, pharyngitis, 83
  of the tongue, gums, membranes, 82
  of the womb, metritis, parturient fever, 222
Influenza, dog, 34
  pink eye, 32
Inguinal hernia, 131
Injuries to the mouth and tongue, 81, 82
Intestine, ruptured, burst gut, 116
Intake penis, inability to, paraphimosis, 195
Interfering, brushing, cutting, overreaching, 335
Internal hemorrhage, 394
Intestinal obstructions, 117
Invalid food, 420
Inversion of the rectum, 119
Iris, 385
Irregularities of the teeth, 75, 76
Itching ears, 294
Itchy legs, 292
Itchy tail, rat-tails, 293

JAUNDICE, the yellows, icterus, 122
Johne's disease, 46
Joint ill, 249
Joint, inflammation of, 249, 365
  open, 324
Joints, dropsical, 326

KENNEL LAMENESS, 55
Kicking, 416
Kidneys, inflammation of the, 138
  diseases of the, 133-138
  stones in the, renal calculi, 140
Knee, capped, housemaid's knee, 329
  inflammation of, 324, 329
  lameness, 324, 329
Knees, broken, 300
Knocked down hips, 317

LABOR PAINS, 209-216
Lacerated wounds, 295-297
Laceration of uterus, 222
Lambing, 209-219
Lameness, hip-joint, 321
  and bone diseases, 321
  diagnosis of, 5-10
  kennel, 55
Laminitis, parturient, fever in the feet, 260, 349
Lampas, paps, barbs, congestion of palate, 83
Laryngitis, sore throat, 164
Larynx, diseases of the, 164
Lead poisoning, 477
Leaking navel, pervious urachus, 244
Leaking, or incontinence of urine, 136, 137
Leaking teats, 234
Leg mange, 273
Legs, itching, 292
Leucorrhea, or whites, 204
Lice, 282
Light, 419
Liniments, 319, 463
Linseed, value of, 421
Lips, diseases of, 79-81
  paralysis of, 80
  sore, stomatitis, 81
Liquors, fermented, etc., 422
List of antidotes and poisons, 476-478
Liver balls, 440
Liver, diseases of the, 119
  chronic inflammation of, cirrhosis, 124
  congestion of, 120
  fatty, 125
  inflammation of, hepatitis, 123
  rupture of, 126
Liver rot worms, flukes, 405
Lock-jaw, tetanus, 51
Loo, low, foul of the foot in cattle, 344
Lotions, 429, 456, 469-472
Louping ill, trembling, sheep staggers, braxy, 24
Lumps and bumps, boils, abscesses, 285
Lumpy jaw, wooden tongue, 56
Lungs, emphysema of, 181
  bleeding from the, hemoptysis, 180
  inflammation of, pneumonia, 174, 177

Luxation of fetlock, 320, 323
Luxation of shoulder, 322
Luxation of stifle, stifle-slip, 322
Lymphangitis, big leg, elephantiasis, Monday morning leg, weed, shake, water farcy, 30
  epizootic, 30, 190, 192

Mad staggers, 147
Madness in dogs, rabies, hydrophobia, 36
Maggots, fly, sheep fly, struck with fly, 280
Male organs of reproduction, diseases of, 193-199
Mallenders and sallenders, 260
Mallein test, 27, 29
Malposition of eyelids, 387
Mammitis, garget, mastitis, fall of the udder, caked bag, etc., 231
Mange, or scab, 273, 277, 465
  leg, 276
  in cats, 278
  in dogs, 278
Mania, puerperal, 230
Mashes, bran, linseed, 421
Mastitis, garget, mammitis, caked bag, etc., 231
Measles, blue sickness, hog cholera, red soldier, swine fever, etc., 50
  German, acne, 291
Medicines, administration of, 424
  for pigs, 452
  list of cattle, 449-451
Megrims, staggers, giddiness, vertigo, 146
Meningitis and cerebritis, 145
Meningitis, spinal, 154, 155
  cerebro-spinal in horses, infectious, 157
Metacarpal periostitis, sore shins, 312
Methods of control, 413
Metritis, inflammation of the womb, parturient fever, 222
Milk and eggs, meat, 422
Milk fever, in cows, dropping after calving, the drop, parturient apoplexy, 225-227
  in sows and bitches, 229, 230
  of eclampsia in bitches, 149
Milks, composition of, 242, 243
Miscarriage, abortion, picking, warping, slipping, slinking, 205
Miscellaneous recipes, 474
Monday morning leg, weed, etc., 30, 439
Moon blindness, constitutional ophthalmia, 379
Mouth disease, foot and, 358
Mouth, diseases of, 38
Mouth and tongue, injuries to, 81, 82
Mud fever, erythema, 253, 265
Muir-ill, red water, black water, hemoglobinuria, Texas fever, 20
Mulling, 372
Murrain, foot and mouth disease, epizootic aphtha, 25, 358
Myelitis, inflammation of the spinal cord, 155

Nasal gleet, running at nose, 161, 162
Navel ill, inflammation of the navel string, 248
Navel, enlarged, ruptured navel, 246
  leaking, pervious urachus, 244
  ruptured, umbilical hernia, 246
Navicular lameness, grogginess, shoulder tied, 353
Nebulæ, clouds, spots on the eye, albugo, 382
Necrosis and caries, 311
Nematoda, ascarides, round and thread worms, 400
Nephritis, inflammation of the kidneys, 138
Nervous diseases, 144-158
Nettle rash, urticaria, surfeit, 265
Neurectomy, neurotomy, unnerving, 378
New-born, troubles of, constipation, 238, 244
Nose, bleeding from the, 163
  running at the, catarrh, common cold, nasal gleet, 159-162
Not cleansing, retention of placenta, 219
Not sucking, 239
Nurse, qualifications of, 418
Nursing and sick foods, 418-423

Obstructions, intestinal, blocked gut, 117
Occult spavin, 311
Œstridæ, bots, ox warble, 407
Œstrus ovis, sheep bots, 408
Oils, 473
Ointments, 466
Open ducts, fistula or parotid duct, 86
Open joints, 324
Operations, 368-378
Ophthalmia, conjunctivitis, moon blindness, simple inflammation, 379
Orchitis, inflammation of the testicles, 198
Organs, diseases of the generative, 199-237
  diseases of the respiratory, 159-187
Orphan rearing, 240
Osteoporosis, spongy bone, rotten bone, 312
Ostitis, inflammation of bone, 311
Ovaries, diseased, 203
Overflow of tears, 388
Overreaching, brushing, cutting, interfering, 335
Overshot fetlock, or luxation, 320, 323

Ox, dentition of, 70
Ox warbles, bots, œstridæ, 407, 408

PAIN KILLERS, 435
Palate, congestion of the, 83
Papillatomes, use of, 233
Paps, barbs, lampas, congestion of the palate, 83
Papules, pimples, 253
Paralysis, 157
  of the tongue and lips, 158
Parasites, worms, 396, 405
Parasitic bronchitis, hask, hoose, hoast, husk, 403
Parasitic diseases, 396-409
Paraphimosis, inability to intake the penis, 195
Pardenziekte, South African horse sickness, 192
Parotitis, inflammation of the parotid gland, 86
Parrot mouth, 78
Parturient apoplexy, 225
Parturient fever, inflammation of the womb, metritis, 222, 225-227, 231
Parturient laminitis, fever of the feet, 230
Parturient troubles, fits after parturition, eclampsia, 149
Parturition, etc., 200, 208
Peas in the teats, 232
Penis, inability to intake, paraphimosis, 195
  amputation of, 197
  enclosure of the, 193
Pericarditis, dropsical heart, heart water, 61
Pervious urachus, leaking navel, 244
Pharynx, diseases of the, throat, inflamflammation of, pharyngitis, 83
Physic, preparations for, 363
Physicking and purging, 363, 364
Phymosis, enclosure of penis, 193
Picking, abortion, miscarriage, slipping, slinking, 205
Pig, dentition of the, 73, 74
  medicines, 452
Pigs, physieking, 364
Piles, hemorrhoids, 394
Pink eye, influenza, 32
Pityriasis, or bran disease, 254
Placenta, retention of, not cleansing, 219
Plague, swine, etc., 50
Plasters or charges, 468
Pleurisy or pleuritis, chest founder, water on the chest, hydrothorax, 183
Pleuro-pneumonia, 183
Pneumonia, inflammation of the lungs, 174, 177
Pocks, or pox, vaccinia, 254
Poisons and antidotes, 430, 474-478
Poll-evil, 299
Polypi, 201
Polyuria, diabetes, profuse staling, 137
Pook, black leg, blood, struck, quarter-ill, symptomatic anthrax, 15
Postpartum hemorrhage, bleeding after delivery, 394
Powders, 427, 445
Presentations, parturient, 214-217
Pricked foot, 347
Profuse staling, diabetes, 137, 438
Ptyalism, salivation, 85
Puerperal eclampsia, 150, 151
Puerperal mania, 230
Punctured wounds, 295-298
Purging, diarrhea, superpurgation, 111
  cattle, sheep and pigs, 364
  dogs and cats, 364, 456
  swine, 364
  and physicking, 363
Purpura hemorrhagica, big head, 17, 190
Pustulosum, eczema impetiginodes, grease, 261
Pustules, 253

QUARTER, false, 343
Quarter-ill, black leg, blood struck, pook, symptomatic anthrax, 15
Quidding, dribbling, slavering, slobbering, 81
Quittor, 343

RABIES, madness in dog, hydrophobia, 36
  dumb, 38
Rearing orphans, 240
Rectum, eversion or inversion of, 119
Red soldier, swine fever, etc., 50
Red water, black water, muir-ill, hemoglobinuria, Texas fever, 20
Remedies, external, 456
Reproduction, diseases of the female organs of, 199-237
  diseases of the male organs of, 193-199
Respiratory organs, diseases of, 159-187
Retention of placenta, not cleansing, 219
Retention of urine, stoppage and, 134
Rheumatic lameness, 190
Rheumatism, cripples, crockles, 54, 188, 189
  in dogs, kennel lameness, 54, 55
Rickets, soft bones, 244
Rinderpest, cattle plague, 25
Ringbone, 304
Ringworm, honeycomb, favus, 280
  white flaw, the flaw, etc., 279
Roaring, whistling, thick wind, 167
Rot, foot, in sheep, 357
  in sheep, liver rot, the rot, coathe, bain, etc., 405

Rotten bone, osteoporosis, spongy bone, 312
Round and thread worms, ascarides, nematoda, 400
Round-bone lameness, stifle joint, whirlbone lameness, 321
Rowelling, setons, setoning, 290, 291, 300
Running at the nose, common cold, catarrh, 159, 160
Rupture, of the bowel, burst gut, 116
  of the liver, 126
  of the navel, umbilical hernia, 246
  of the sac, 210
  of the stomach, 99
  of the uterus, 222
  or hernia, strangulated, scrotal, ventral, umbilical, 129

SADDLE GALLS, 287
Salivary calculi, or spittle stones, 87
Salivation, ptyalism, 85
Sallenders, mallenders, 260
Sand crack, 338
Saturation, carbolic, 207
Scab in sheep, scab, shab, 277
Scalds, 266
Scarifying, 376
Scour, 109, 452, 454
Scours, skit, white skit, etc., 110, 249
Scratches, chapped heels, sprayed skin, 263
Scrotal hernia, 129-132
Seedy toe, 340
Serous abscess, 286
Sesamoid bones, inflammation of, 320
Setoning, rowelling, setons, 290, 291, 300
Shab, scab, or mange, 273
Sheath, dropsical, swelled sheath, edema of, 196
Sheep-bots, œstrus ovis, 408
Sheep, dentition of the, 72
  fly, fly maggots, struck with the fly, 280
  foot rot in, 357
  medicines, 451
  pox, the pock, vaccinia, 254, 256
  scab, shab, or mange, 273, 277
  staggers, louping-ill, trembling, 24
Shivering, chorea, stringhalt, St. Vitus's dance, chinked back, 149
Shoe boil, capped hock, capped elbow, capped knee, 329
Shot of grease, big leg, Monday morning leg, elephantiasis, weed, shake, water farcy, 30-33
Shoulder lameness, 322
Shoulder-slip, 322
Shoulder tied, grogginess, navicular disease, 353
Show condition, 361
Shying, wolf's teeth, 79
Sick box, 418, 419
Sick foods, care of the sick, 418, 419
Sidebone, 352
Simple treatment of wounds, 294-298
Simple wounds, 294-298
Sitfast, 288
Skin diseases, 251-303
Skit, infectious, skit, scours, scouring, white skit, 110, 249
Skull and brain tumors, 153, 154
Slavering, slobbering, dribbling, quidding, 81
Sleepy staggers, 145
Slinging, slings, 416, 417
Slinking, slipping, abortion, miscarriage, picking, warping, 205
Soft bones, rickets, 244
Soft feet and deformity, 244
Sore eyes, 387
Sore lips, 79
Sore shins, metacarpal periostitis, 312
Sore throat, laryngitis, 83, 164
South African horse sickness, horse death, perreziekte, pardenziekte, 192
Sows and bitches, milk fever in, 229, 230
Spasm of the diaphragm, 128
Spavin, bone spavin, bog and blood spavin, 308, 326
Spavin, occult, 311
Spaying, 373
Spittle stones, salivary calculi, 87
Splenic fever, anthrax, 12
Splints, 306
Split teeth, 77
Spinal cord, inflammation of the, 155
Spinal membranes, inflammation of the, 155
Spinal meningitis, 154, 155
Spongy bone, osteoporosis, rotten bone, big head, 312
Spots on the eye, cataract, 382
Sprain of suspensory ligament, 310
Sprain of tendo-subcarpal ligament, 310
Sprained fetlock, 320
Sprains or strains, 317
Sprayed skin, cracked heels, scratches, 263
Sprung hock, 310, 328
Squamæ, 254
Squinting, strabismus, 386
Stabbed foot, 347
Staggers, mad, 147
  megrims, giddiness, vertigo, 146
  stomach, sleepy, 145
Staling, profuse, diabetes, polyuria, 137, 438, 439
Staphyloma, grape on the eye, 383
Sterility and barrenness, 202-205

Stifle-joint lameness, round-bone, or whirl-bone lameness, 321
Stifle-slip, or luxation of the stifle joint, 322
Stimulants, 422, 436
Stings and bites, 268
Stings, antidotes, 268
Stitches or sutures, 296
Stomach disease, 97-99
Stomach, impaction of, rupture of, 99
Stomatitis, sore lips, inflammation of mouth, thrush, etc., 81
Stones, gall, 139
  in the kidney, 140
  renal calculi, 140
  spittle, 87
Stoppage of urine, 134
Strabismus, squinting, 386
Strain of the back tendons, 319
Strain of the suspensory ligament, 319
Strain of the tendo-subcarpal ligament, 320
Strangles, febra, pyogenica, 47
Strangulated hernia, twisted gut, 129
Stringhalt, chorea, shivering, 149, 150
Striking of blood, braxy, louping-ill, 24
String, inflammation of the navel, navel ill, 248
Strongyles, 402
Struck with fly, sheep fly, fly maggots, 280
Sturdy, gid, turnsick, 146, 147
St. Vitus's dance, chorea, shivering, stringhalt, 149, 150
Sucking, not, 239
Sunstroke, heatstroke, heat apoplexy, puerperal eclampsia, 150, 152
Superpugation, diarrhea, purging, 111, 112
Surfeit, nettle rash, urticaria, 265
Suspended animation, 238
Sutures or stitches, 296
Swelled sheath, dropsy of the sheath, 196
Swine fever, red soldier, blue sickness, measles, etc., 50
Swine, giving medicines to, 427
  purging of, 364
Symptomatic anthrax, black leg, blood struck, pook, quarter-ill, etc., 15

TABLE OF TEMPERATURES, 5
Table of doses, 431-433
Tail, itchy, 293
Tapeworm, cestoda tæniæ, 397
Tears, overflow of, 388
Teat injuries and troubles, 234
Teats, leaking, 234
  peas in the, 232
Teeth, decay or caries of, 78
  diseases and irregularities of, 67-80
  excessive number of, 76
Temperature table, 5
Tendo-subcarpal ligament, strain of the, 320
Testicles, diseases of, orchitis, 198
Tetanus, lock-jaw, 51
Texas fever, 20
Therapeutic measures, general, 410-423
Thick wind, roaring, whistling, 167
Thorough-pin, bog spavin, 308, 327
Thorter-ill, louping-ill, trembling, sheep staggers, 24
Throat, abscess of the, 84
  sore, laryngitis, 164
Thrush, 81, 345
  aphtha, inflammation of the mouth, stomatitis, 81
Ticks, 270, 282
Timber leap, 333
Toe, seedy, 340
Tongue, inflammation of the, 82
  injuries to, paralysis of, 81
Tongue-tie, 250
Tonics, 444, 446-449
Tracheotomy, 169
Trapping, 372
Tread, 355
Trematoda, fluke worms, 405, 451
Trembling, louping-ill, sheep staggers, 24
Troubles of the new-born, suspended animation, constipation, 238, 244
Tubercula, 254
Tuberculin testing, 40-46
Tuberculosis, consumption, 40
Tumors, 56, 331, 356
  in the brain and skull, 153, 154
Turnsick, gid, sturdy, 146, 147
Twisted gut, strangulated hernia, 129
Tympanitis, blast, blown, hoven, 100-107

UDDER, fall of, 231
Ulceration of cornea, 382
Ulceration of eyes, cornea, 382
Ulcers, 254
Umbilical hernia, ruptured or enlarged, 129, 246
Unnerving, neurotomy, 378
Urachus, pervious, leaking navel, 244
Urinary apparatus, diseases of the, 133
Urine, incontinence of, 136, 137
  bloody, hematuria, 138
  retention of, 134
Urticaria, nettle rash, surfeit, 265
Uterus, or vagina, acidity of the, 202
  eversion of, coming out of the womb, fall of the calf-bed, 220
  rupture and laceration of, 222

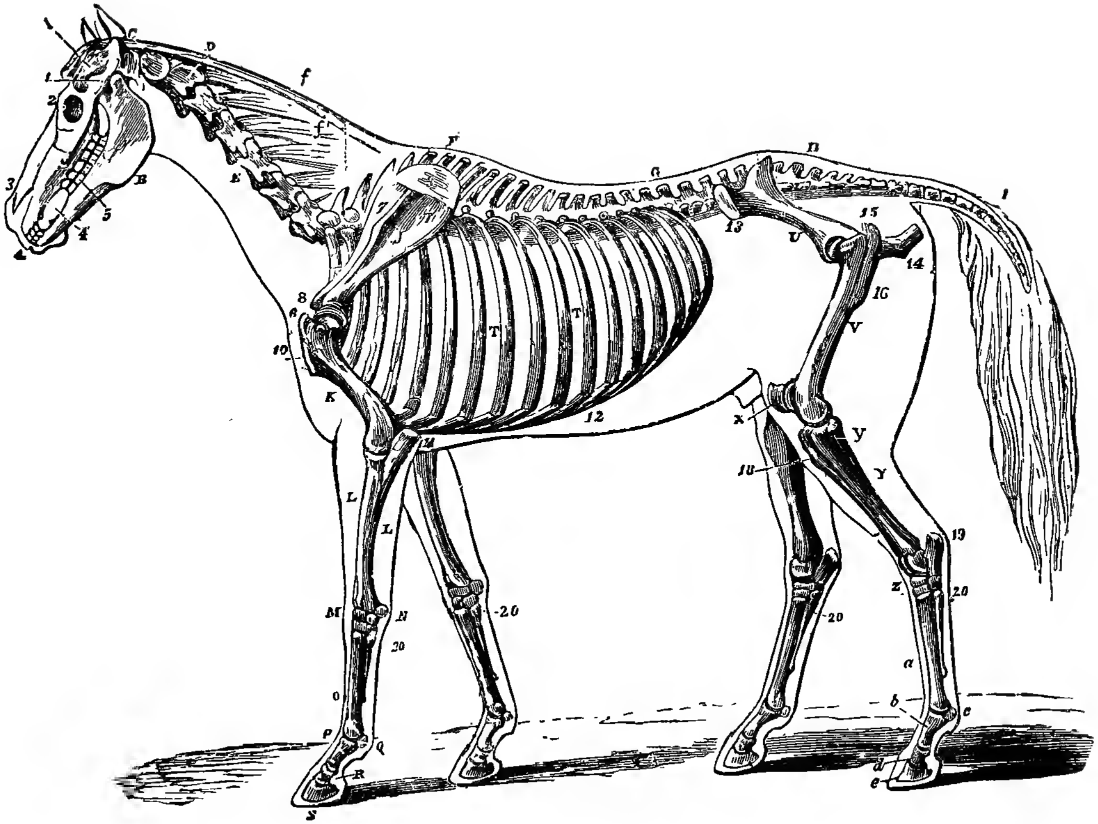
VACCINIA, the pock, horse-pox, cow-pox, sheep-pox, 254
Vagina, or uterus, acidity of, 202

Ventilation, 419
Ventral hernia, umbilical, 129-132
Verminous bronchitis, 403
Verrucæ, warts, wens, angleberries, 270
Vertigo, giddiness, megrims, staggers, 146
Vesicles, blisters, 253
Vices and tricks of horses, 416
Villitis, inflammation of the coronet, 355
Vitus's dance, St., chorea, stringhalt, 149, 150
Vomiting, 92

Warbles, œstridæ, bots, 407
Warping, abortion, miscarriage, picking, slipping, slinking, 205
Warts, wens, angleberries, verrucæ, 270
Water, temperature of, 423
  on the chest, chest founder, pleurisy, pleuritis, hydrothorax, 183
  farcy, big leg, etc., 30, 31
  of the heart, dropsical heart, pericarditis, 61
Weed, 30, 190
Wheals, 253
Whirl-bone lameness, round-bone, stifle-joint lameness, 321
Whistling, roaring, thick wind, 167
White flaw, the flaw, ringworm, 279
White skit, scours, skit, 110, 249
Whites, or leucorrhea, 204
Wind, broken, chronic emphysema, 181
  thick, whistling, roaring, 167
Windgalls, dropsical bursæ, 333
Withers, fistulous, 289
Wolf's teeth and shying, 79
Womb, coming out of, fall of the calf-bed, eversion of uterus, 220
  inflammation of, 222
Wooden tongue, actinomycosis, lumpy jaw, big jaw, etc., 56
Worm balls, 441
Worms in the eye, 388
Worms, parasites, 396, 405
  round and thread, ascarides, nematoda, 400
  tape, 397
Wounds, classification of, 294, 295
  contused, 295, 297
  incised, 295-297
  lacerated, 295-298
  of the eyelids, 388
  punctured, 295-298
  simple, 294
  stitching or suturing, 296
  treatment of, 294-298

Yellows, the jaundice, icterus, 122
Yew poisoning, 475

PLATE 1.



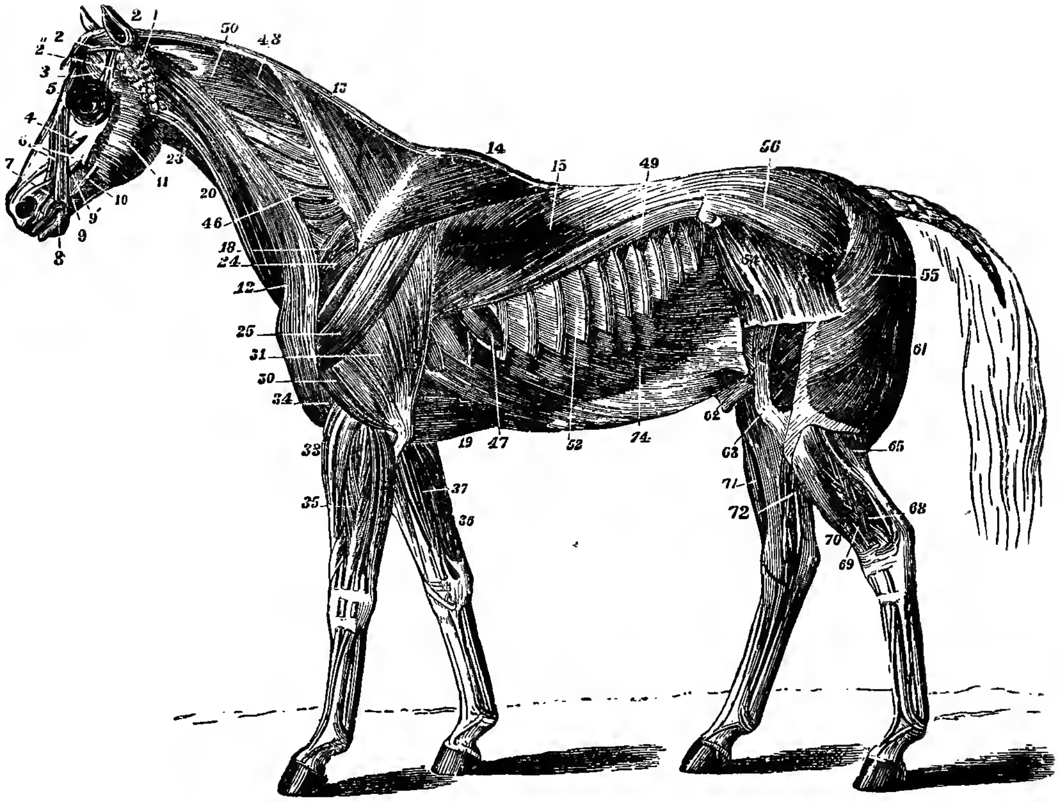
SKELETON OF HORSE—*after Mégnin.*

EXPLANATION OF PLATE I.

Skeleton of the Horse,

Showing its relation to the contour of the animal, viewed laterally.

A. Temporal fossa.
B. Inferior maxilla.
C. Atlas.
D. Dentata.
E. Cervical vertebræ.
F. Dorsal do.
G. Lumbar do.
H. Sacral do.
I. Coccygeal do.
J. Scapula.
K. Humerus.
L. Radius.
L′. Ulna.
M. Carpus.
N. Trapezium.
O. Metacarpus.
P, *b*. Os suffraginis.
Q, *c*. Sesamoids.
R, *d*. Os coronæ.
S, *e*. Os pedis.
T T. Ribs.
U. Ilium.
V. Femur.
X. Patella.
Y. Tibia.
y. Fibula.
Z. Tarsus.
a. Metatarsus.
f. Ligamentum nuchæ, funicular portion. *f′*. Lamellar portion.
1. Zygoma.
2. Orbital fossa.
3. Nasal peak.
4. Incisor teeth.
4′. Canine teeth.
5. Molar teeth.
6. External humeral trochanter.
7 7. Scapular fossæ.
8. Coracoid apophysis.
9. Cartilage of prolongation.
10. Deltoid ridge, and external tuberosity.
11. Olecranon.
12. Costal cartilages.
13. Anterior iliac spine.
14. Ischium.
15. Trochanter major.
16. Trochanter minor.
18. Anterior tibial tuberosity.
19. Calcaneum.
20 20. Small metacarpal and metatarsal, or splint bones.



MUSCLES OF THE HORSE—SUPERFICIAL LAYER—*after Mégnin.*

EXPLANATION OF PLATE II.

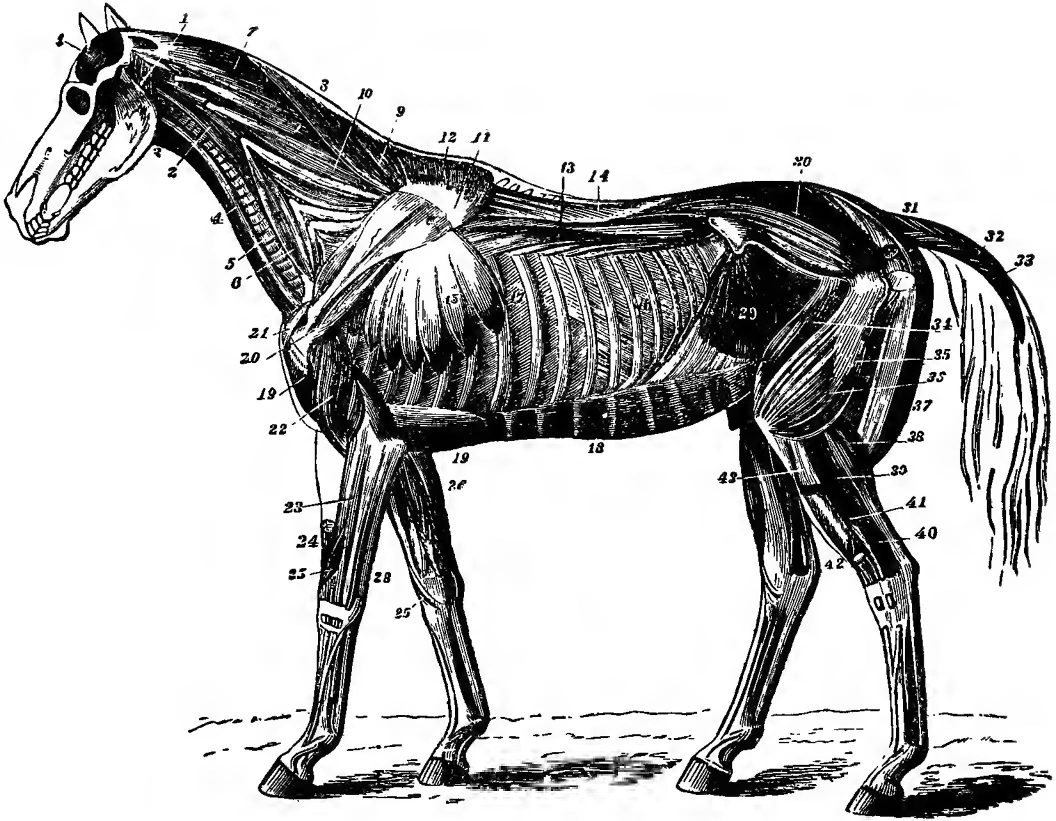
MUSCLES OF THE HORSE.

Superficial Layer.

The panniculus and tunica abdominalis are removed.

1. Abducens.
2. Retrahentes muscles.
2′. Attollens maximus.
2″. Attollens anticus.
3. Temporalis.
4. Nasalis longus.
5. Orbicularis palpebrarum.
6. Levator labii superioris alæque nasi.
7. Dilatator naris lateralis.
8. Orbicularis oris.
9. Zygomaticus.
9′. Buccinator.
10. Depressor labii inferioris.
11. Masseter.
12. Levator humeri.
13. Trapezius cervicalis.
14. Trapezius dorsalis.
15. Latissimus dorsi.
18. Pectoralis parvus.
19. Pectoralis magnus.
20. Sterno-maxillaris.
23. Subscapulo-hyoideus.
24. Antea-spinatus.
25. Teres externus.
26. Postea-spinatus.
30. Caput medium } of the triceps
31. Caput magnum } extensor brachii.
33. Extensor metacarpi magnus.
34. Humeralis obliquus.
35. Extensor pedis.
36. Flexor metacarpi externus and medius.
37. Flexor metacarpi internus.
46. Cervical } serratus magnus.
47. Dorsal }
48. Rhomboideus longus.
49. Superficialis costarum.
50. Splenius.
52. Intercostales.
54. Tensor fasciæ latæ.
55. Triceps abductor femoris.
56. Gluteus externus.
61. Biceps rotator tibialis.
62. Rectus femoris.
63. Vastus externus.
65. Gastrocnemius
68. Flexor pedis perforans.
69. Peroneus.
70. Extensor pedis.
71. Flexor metatarsi.
72. Flexor pedis accessorius.
74. Obliquus abdominis externus.

PLATE III.



MUSCLES OF THE HORSE—DEEP LAYER—*after Mégnin.*

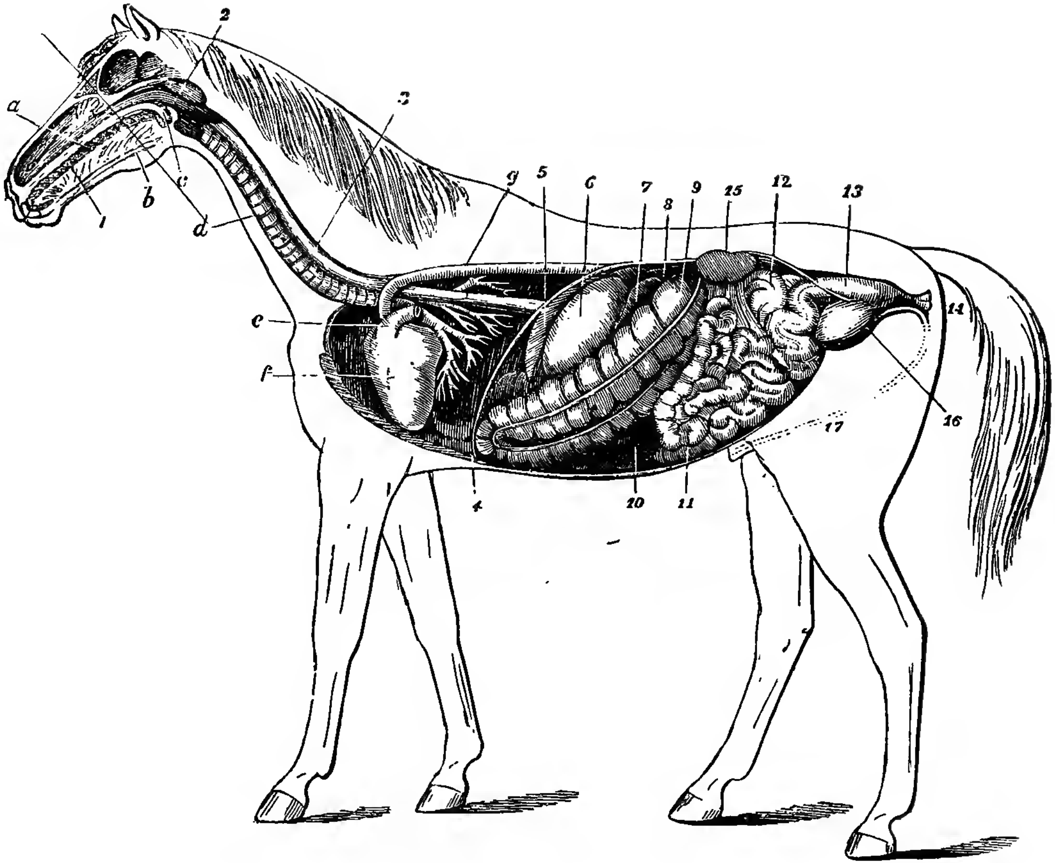
EXPLANATION OF PLATE III.

MUSCLES OF THE HORSE.

Deep Layer.

1. Temporalis.
1 . Stylo-maxillaris.
2. Rectus capitis anticus major.
3. Sterno-thyro-hyoideus.
4. Sterno-maxillaris.
5. The Trachea.
6. Scalenus.
7. Splenius.
8. Funicular part of ligamentum nuchæ.
9. Rhomboideus longus.
10. Cervical } serratus magnus.
15. Costal }
11. Cartilage of prolongation.
12. Rhomboideus brevis.
13. Transversalis costarum.
14. Longissimus dorsi.
15. Serratus Magnus.
16. External intercostals.
17. Internal intercostals.
18. Rectus abdominis.
19 19. Pectoralis magnus.
20. Postea-spinatus minor.
21. Flexor brachii.
22. Humeralis obliquus.
22'. Caput parvum (of triceps extensor brachii).
23. Extensor suffraginis.
24. Extensor metacarpi magnus divided.
25. Extensor metacarpi obliquus
25'. Its tendon.
26, 28. Flexor pedis perforans and perforatus.
29. Obliquus abdominis internus.
30. Gluteus maximus.
31. Erector coccygis.
32. Curvator coccygis.
33. Depressor coccygis.
34. Rectus femoris.
35. Vastus externus.
36. Part covered by triceps abductor.
37. Biceps rotator tibialis.
38. Gastrocnemius externus.
39. Plantaris.
40. Flexor pedis perforans.
41. Peroneus.
42. Flexor metatarsi.
43. Extensor pedis (cut across).

Plate IV.



DIGESTIVE AND MALE URINARY APPARATUS OF A HORSE—*after Mégnin.*

EXPLANATION OF PLATE IV.

DIGESTIVE APPARATUS OF THE HORSE.

1. Mouth.
2. Pharynx.
3. Œsophagus.
4. Diaphragm.
5. Spleen.
6. Stomach (left sac).
7. Duodenum.
8. Liver (upper extremity).
9. Great colon.
10. Cæcum.
11. Small intestine.
12. Floating colon.
13. Rectum.
14. Anus.
15. Left kidney and ureter.
16. Bladder.
17. Urethra.

A. Hard palate.
B. Tongue.
C. Soft palate.
D. Trachea.
E. Pulmonary artery (divided).
F. Heart.
G. Posterior aorta.